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Economic Impact Analysis of Anticipated Hazardous Waste Management Regulations of the Leather Tanning and Finishing Industry

Development Planning and Research Associates, Inc, Manhattan, KS

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ECONOMIC IMPACT ANALYSIS
OF ANTICIPATED HAZARDOUS WASTE MANAGEMENT REGULATIONS
OF THE LEATHER TANNING AND FINISHING INDUSTRY

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This report covers the economic impact analysis of hazardous waste management regulation on the leather tanning and finishing industry (SIC 3111). For purposes of the study, the industry was segmented by different types of firms and plants that produce hazardous waste. A total of six different segments were eventually established and described. Of the six segments, four were subcategorized according to representative plant sizes. Furthermore, the study includes an impact analysis methodology, evaluation of financial conditions, description of price determinants and other factors affecting supply and demand, costs of compliance, estimation of impacts and limits of the analysis.

The imposition of a hazardous waste management regulation on the industry is estimated to generally create minor impacts on leather tanners. No tanners are expected to close because of increased costs although split tanners could be forced to shut down if costs are slightly higher than used in the analysis. With costs 20 percent higher, split tanners are projected to experience negative net present value and would be assumed to shut down. Other impacts, such as on prices, production, employment and international trade, are projected to be negligible.

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PREFACE

The attached document is a Contractor's study prepared with the supervision and review of the Hazardous Waste Management Division of the U.S. Environmental Protection Agency (EPA). Its purpose is to provide a basis for evaluating the potential economic impact of hazardous waste management regulations established by EPA pursuant to the Resource Conservation and Recovery Act of 1976 (P.L. 94-580).

The study supplements EPA technical studies on assessment of hazardous waste and costs of complying with the hazardous waste management regulation for the leather tanning and finishing industry. The technical studies survey existing and potential waste streams and disposal methods and technologies within this category and presents the costs associated with appropriate control technology. This study supplements those analyses by estimating the broader economic effects (including product price increases, continued viability of affected plants, employment, industry growth and foreign trade) of the compliance by a specified disposal technology.

This study has been submitted in fulfillment of Contract No. 68-01-4339 by Development Planning and Research Associates, Inc. Work was completed as of February 1978. The study is based primarily upon an earlier analysis that had been completed by the Contractor which was modified and updated to appropriately reflect recent changes that may have occurred.

This report represents the conclusions of the Contractor. It has been reviewed by the Hazardous Waste Management Division of EPA and approved for publication. Approval does not signify that the contents necessarily reflect the views of the Environmental Protection Agency.

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EXECUTIVE SUMMARY

The general purpose of this report is to present the economic impact analysis of hazardous waste management regulations (Resource Conservative and Recovery Act of 1976, P.L.94-580) on the Leather Tanning and Finishing Industry (SIC 3111). Much of the emphasis for analysis was placed on four major topics. They included development of a methodology, analysis of financial conditions, analysis of pricing practices, and projection of actual economic impacts. In addition, the authors included substantial information on the industry structure. To follow is a summary of the findings.

Methodology

The methodology of evaluating economic impacts included a comparison between projections of effects on certain economic variables or characteristics with compliance with the given regulations and without compliance (baseline). Economic variables assessed include: (1) price effects on producers, consumers and suppliers, (2) profitability and financial status of the industry and plants, (3) expected plant closures, (4) employment changes (5) community conditions, and (6) balance of payments.

Structure of the Industry

The Leather Tanning and Finishing Industry, as defined within SIC 3111, includes leather tanneries, converters and contract tanneries. While all are engaged in tanning, curing, finishing, storing and marketing leather, only the regular tanners and some contract tanners (leather finishers) will be impacted by the regulations to control hazardous waste (HW). Leather converters primarily buy hides and skins and have them processed into leather on a contract basis by others. Their establishments, therefore, do not generate hazardous waste.

In 1976, there were estimated to be about 250 establishments that are either regular leather tanneries or leather finishers who generate substantial amounts of solid waste. Of these about 30 are vegetable tanneries and generally do not generate hazardous waste, thus leaving 220 potentially impacted plants. Most of the plants are located in the Northeast and Lake States.

The size of plants varies from a production of less than 100 hides per day to over 2,000 hides per day.

The general process of the industry includes converting a putrescible raw animal hide into usable finished leather. However, within this general process there is virtually no end to the variety of leathers than can be produced.

Financial Conditions

In recent years, financial conditions exhibited in the leather industry have been depressed. Three conditions account for much of the financial decline. First, foreign leather and leather goods producers have gained a large share of the U.S. leather market by underpricing U.S. producers. Second, foreign tanners also purchase large quantities of raw hides, pushing their price up and increasing domestic tanners costs which are difficult to pass on to consumers. Finally, the availability of synthetic substitutes has reduced aggregate demand for leather.

The situation has improved in 1974, 1975 and 1976, however, the financial status of the leather industry does not appear to be highly favorable.

Profits before tax as a percent of sales average about 2 to 2½ percent in the early 1970's and climbed to 6 and 6½ percent in 1974 and 1975. A 4 to 6 percent profit before tax can probably be expected for the immediate future.

Prices

The price of leather was at a record level in 1976 with a wholesale price of $1.11 per square foot. This is up from a price of $.80 per square foot the previous year. Price fluctuations in the 1970's represent the first major price movements in the industry in about 10 years as prices during the 1960's were relatively stable at around $.60 to $.65 per square foot.

Hide prices have moved in a fashion similar to wholesale leather prices as there is typically a somewhat stable hide to leather price spread.

Economic Impacts

Based on costs provided by the EPA technical contractor[1/], economic impacts were analyzed on key industry factors including: (1) price, (2) financial conditions, (3) production, (4) employment, (5) communities and (6) foreign trade. For the most part, the impacts on the industry are expected to be modest.

The price increase required to offset HW disposal costs and maintain profits for the industry will generally be 0.5 percent or less of the product prices for the various segments of the industry. However, two industry segments would require substantially higher percentage price increases. Thru-the-blue cattlehide and cattle split tanners would require price increases of 1.8 and 3.4 percent respectively. This reflects a combination of less valuable final products and relatively high waste generation per unit of production.

Because they operate in a highly competitive market, tanners have little success in passing through increased costs of production to consumers. Thus, the expected price increases actually occurring are estimated to be only a small portion of the required price increases listed above.

Generally, the impacts on financial conditions in the industry will be small. However, thru-to-blue and split tanners will be exceptions, as impacted

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[1/] Battelle Columbus Laboratories, Cost of Complying with Hazardous Waste Management Regulations, draft report for EPA, Contract No. 68-01-4360, October 12, 1977.

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plants in these segments are estimated to have after-tax incomes reduced 39 percent and 57 percent respectively. Considering only HW management requirements, both types of plants would maintain positive income streams and positive net present values. However, if HW management costs are 20 or more percent higher than those provided for the study, then split tanners are estimated to become financially threatened as their net present values become negative.

As plants are expected to be able to maintain profitability after costs for hazardous waste management, no plant closures are estimated to occur solely because of HW management regulations. Therefore, production losses attributable to the regulation are estimated to be minimal, if any.

The small impacts on prices, plant profitability and production establish the level of impacts on the other critical economic variables considered; employment, community and balance of trade effects. For each of these areas of concern, impacts from hazardous waste management regulations are expected to be small.

I. INTRODUCTION

A. Scope and Organization of this Report

The Environmental Protection Agency is responsible for establishing hazardous waste management regulations for various industries including the Leather Tanning and Finishing Industry (Standard Industrial Classification 3111) under the provisions of the Resource Conservation and Recovery Act of 1976. The purpose of this report is to analyze the economic impact of such regulations on the Leather Tanning and Finishing Industry.

There are four phases of analysis included in the work scope. They include: (1) determination of the financial structure of the impacted industrial sectors, (2) assessment of the pricing practices and effects in the industry, (3) development of an impact analysis methodology, and (4) estimation and projection of actual economic impact.

The following economic impacts were analyzed and, to the extend that they were found to be significant, are described in this report.

1. Price and production effects - short and long-run effects on suppliers and consumers, possible curtailments and closures with special attention to small businesses;
2. Financial effects - pre-tax income, other profit parameters and capital availability;
3. Employment and wage effects;
4. Community impacts; and
5. Foreign trade consequences.

The basic organization of this report consists of establishing the overall Tanning Industry's situation including discussions on the industry's structure, financial and pricing characteristics. From these data, representative model plants are developed which serve as a baseline (before hazardous waste management regulations) from which impacts can be measured. Finally, the model plants are impacted utilizing waste management costs provided by EPA and the overall industry impacts determined.

B. Data Sources

The most commonly used and, in many cases, the most readily available sources of industry information including employment, location, value of shipment and product data are available from the U.S. Department of Commerce, particularly its Census of Manufactures, Annual Survey of Manufactures and Industrial Outlook. Additionally, the Tanners' Council of America publishes an annual report, the Leather Industry Statistics, which contains the most recent industry production data. Financial data are somewhat limited as much of the published data are aggregated such that information concerning just the Leather Tanning Industry are not available. These sources of financial data include the Robert Morris Associates, Statement Studies; Troy's Almanac of Business and Industrial Financial Ratios; and the Internal Revenue Service's, Source Book of Statistics of Income.

The above sources do provide sufficient data such that generalizations concerning the industry as a whole can be made. However, much more detailed information was required in order to accurately represent the industry for the impact analysis. Information of such a nature was obtained from a recently distributed data collection portfolio which provided data on about 200 tanneries in the industry.[1]

Of the 302 data collection portfolios sent, 135 responses were received reflecting various stages of completion. A technical contractor also utilized a survey of the industry and was able to provide additional information concerning some 65 tanneries. Thus, in total, some information was available for about 200 tanneries in the industry.

Also, plant visitations were utilized to gain insight to problems about the industry, its operation, and foreseeable problems concerning the implementation of waste management regulations.

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[1] The data collection portfolios were developed, distributed and analyzed under EPA Contract No. 68-01-4182 dated 9/20/76 as amended. The study was designed to assess the economic impact of water effluent controls on the leather tanning industry.

II. METHODOLOGY

The methodological approach utilized to assess the likely economic impact of proposed hazardous waste management requirements pursuant to the Resource Conservation and Recovery Act of 1976 (P.L. 94-580) on the Leather Tanning and Finishing Industries is summarized in this chapter.

In this study, economic impact is defined as the comparison between (1) the projections of the likely effects on plant, local area, U.S. and foreign activity which would result from an industry's compliance with a given level of hazardous waste management requirements and (2) projection of industrial activity and changes which would likely occur in the absence of the Act (baseline).

In particular, the principal economic variables of interest in this study are:

1. Price effects - including effects upon industry's suppliers and consumers
2. Profitability, growth and capital availability
3. Number, size, and location of plants that can be expected to close or curtail productions
4. Changes in employment
5. Community impacts
6. Balance of payments consequences
7. Any other impacts

Economic impacts were evaluated for hazardous waste management which is defined practices involved in the handling and disposal of such land destined waste. Waste management requirements for the Leather Tanning and Finishing Industry are described in a separate EPA report 1/.

The impact analyses focus on price increases, plant closures, curtailment of production, dislocations of production, unemployment, community impacts, and balance of trade effects.

1/ Battelle Columbus Laboratories, Cost of Complying with Hazardous Waste Management Regulations, draft report for EPA, Contract No. 68-01-4360, October 12, 1977.

Several interrelated analyses are used to evaluate likely economic impacts resulting from hazardous waste management regulations on the Leather Tanning and Finishing Industry. These in-depth analyses include: (1) characterization and subcategorization of the technical and economic structure of the industry and segments, (2) description of the financial profile of the industry and segments, (3) construction of representative model plants, (4) evaluation of pricing patterns within the industry, (5) determination of technological options for meeting designated levels of solid waste management and the costs associated with each option, and (6) analysis of economic impacts.

The analysis, however, is not a simple sequential analysis; rather it employs interacting feedback steps. The schematic of the analytical approach is shown in Figure 1. Due to the fundamental causal relationships among the financial and production effects and other impacts, a greater emphasis is devoted to plant closure analysis.

A. Industry Structure and Subcategorization

The industry structure and subcategorization phase of the methodology primarily involves describing and segmenting the industry in terms of past and current economic characteristics. The purpose of this phase of the analysis is to provide an information base to be used in subsequent analysis. In particular, the information on industry characteristics is useful in determining an appropriate disaggregation design for industry subcategorization.

Subcategorization involves segmenting the plants within the industry into relatively homogenous classes with respect to plant size, regional differences, technology employed, number of products, existing level of pollution, scale of technological processes, level of output, or other relevant factors important for assessing the economic and financial impact of waste management. The delineation of industry subcategories developed in the early stages of the analysis serves as the basis for the definition and construction of representative model plants and the determination of technological options and costs for waste handling and disposal.

B. Financial Profile of the Industry

The ability of firms within the industry to pass on and/or absorb costs for hazardous waste management is determined in part by past and expected financial conditions of those firms. Under the heading "financial profile of the industry," various factors are studied to develop insight into the financial characteristics of actual plants in the industry. Much of the data compiled in this section is also useful in determining financial profiles of representative model plants.

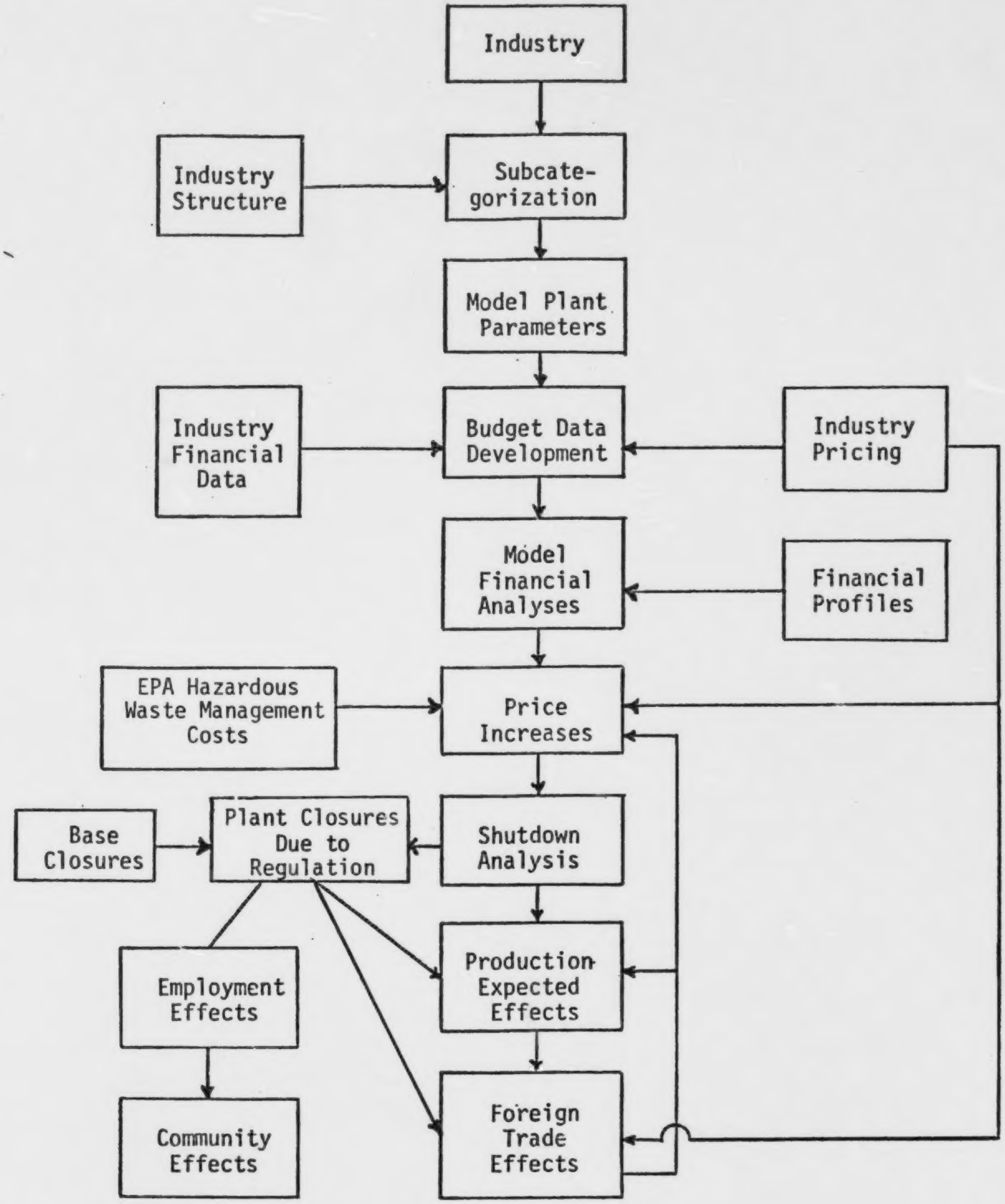
Industry
Industry Structure
Subcategorization
Model Plant Parameters
Industry Financial Data
Budget Data Development
Industry Pricing
Model Financial Analyses
Financial Profiles
EPA Hazardous Waste Management Costs
Price Increases
Base Closures
Plant Closures Due to Regulation
Shutdown Analysis
Employment Effects
Production Expected Effects
Community Effects
Foreign Trade Effects

Figure 1. Schematic of economic impact analysis of hazardous solid waste management regulations.

Key financial statistics include after-tax profit as a percent of sales, after-tax profit as a percent of invested capital, sales to total assets ratios, sales per employee, assets per employee, and after-tax profit to net worth. As costs are generated primarily from paying for a service, most impacts will be on current revenues and operating expenses. Financial factors related to the ability to finance new investments will not be important as little, if any, investment will be required. The data compiled in this phase of the analysis provide an information base useful for projecting key technical and economic factors and for carrying out subsequent economic impact analysis.

C. Model Plants

The model plant concept represents a systematic framework from which to assess likely economic impacts on individual types and sizes of actual plants within the industry. Usually more than one model plant is required for an industry in order to represent various types and sizes of existing plants or plants which are likely to be constructed after the promulgation of the regulations.

Model plants represent a variety of financial, economic, and technical variables such as sales, investment, fixed and variable costs, profits, size, type or process, etc. Model plant profiles are constructed from data and information gathered in the industry characteristics and subcategorization and financial profile phases of a previous analysis. Additional data, as required, are generally obtained from industry representatives, trade publications, and from engineering cost-synthesis methods.

The applicability of utilizing model plant data for assessing expected economic impacts of hazardous waste management regulations rests principally on the representativeness of the selected model plant(s). For example, the economic concept of "economies-of-scale" in production is often present in processing plants, e.g., average unit costs of production are usually lower in large plants as compared with medium or small plants of the same type. Although predicted to be small, the economies-of-scale in solid waste management, in effect, will further compound the economies-of-scale relationships among differing sizes of plants.

Other processing factors, e.g., type of manufacturing process employed (technology) may also affect waste streams and, thus, impacts. This again may necessitate further segmentation of an industry and the inclusion of additional model plants for more comprehensive analysis.

D. Pricing Patterns

The analysis of pricing patterns in the Leather Tanning Industry focuses on factors determining supply and demand. Market structure and the nature of competition are evaluated which, for the Leather Industry, involves the inclusion of the influence that international markets and competition assert on the domestic industry's prices. Finally, the ability of impacted tanneries to recover the increased costs of hazardous waste regulations is assessed.

E. Waste Treatment Technological Options and Costs

Hazardous waste management options and associated costs are made available from a separate EPA report 1/. The technical and cost data from the report are general and apply to certain categories of waste streams developed in industries. The acceptability and unit costs of technology used for waste stream categories are assumed to be constant for any size or type of plant that produces a certain type of waste stream. The technical study on costs of complying assumed all leather tanners create the same waste stream category, solids and sludges containing hazardous waste. All leather tanners will be assumed to dispose of the waste in secured landfills.

In relation to the model plants, the costs per metric ton of waste will be constant for all plant sizes and segments. Segments will produce greater waste loads per unit of output and, thus, effect costs of waste management. Sizes of plants, however, will only be significant in assessing the ability to cover costs as technical reports contain no information relating size of plants to waste loads generated or costs.

F. Analysis of Economic Impacts

In carrying out an economic impact analysis, it is important to establish a baseline of industry conditions that are expected without regulations and to estimate the impact in terms of the change from this baseline attributable to the imposition of waste management regulations. Thus, in this study, a "dynamic baseline", namely a projection of the industry structure in terms of number of plants, production, employment and other parameters over time, is used as opposed to a "static" baseline which assumes a baseline condition equivalent to that currently present.

1/ Battelle Columbus Laboratories, Cost of Complying with Hazardous Waste Management Regulations, draft report for EPA, Contract No. 68-01-4360, October 12, 1977.

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Fundamentally, the impact analysis is similar to that usually required for any capital budgeting study of new investments. The problem is one of deciding whether a commitment of time or money to a project is worthwhile in terms of the expected benefits. The analysis is complicated by the fact that benefits and costs will accrue over a period of time and that, in practice, the analyst can not reflect all of the required imponderables, which by definition must deal with future projections. In the face of imperfect and incomplete information and of time constraints, the industry segments are described in the form of financial budgets of model plants. Key non-quantifiable factors were considered in the interpretation of the quantified data. Actual financial results will deviate form the model results, and these variances will be considered in interpreting the findings based on model plants.

The analysis of anticipated economic impacts of hazardous waste management regulations are described as follows.

Fundamental Core Methodology

The fundamentals for analysis are basic to all impact studies. The core methodology is described here as a unit with the specific impact analyses discussed under the appropriate headings following this section.

The core analysis for this study was based upon synthesizing the physical and financial characteristics of the various industry segments through representative model plant projections. Estimated financial profiles and cash flows are presented in the industry reports. The primary factors involved in assessing the financial and production impact of regulations are profitability changes, which are a function of the cost of waste management and the ability to pass along these costs in the form of higher prices. In reality, closure decisions are seldom made on a set of well-defined and documented economic rules. They include a wide range of personal values, external forces such as the inability to obtain financing, or the relationship between a dependent production unit and its larger cost center whose total costs must be considered.

Such circumstances include but are not limited to the following factors:

1. Inadequate accounting systems or procedures. This is especially likely to occur in small, independent plants which do not have effective cost accounting systems.

2. Insufficient production units. This is especially true of plants where the equipment is old and fully depreciated and the owner has no intention of replacing or modernizing them. Production continues as long as labor and materials costs are covered and/or until the equipment fails entirely.

3. Personal values and goals associated with business ownership that override or constrain rational economic rules. This complex of factors may be referred to as the value of psychic income.

4. Production dependence. This is characteristic of a plant that is a part of a larger integrated entity which either uses raw materials being produced profitably in another of the firm's operating units or supplies raw materials to another of the firm's operations where the source of supply is critical. When the profitability of the second operation more than offsets the losses in the first plant, the unprofitable operation may continue indefinitely because the total enterprise is profitable.

5. Temporary unprofitability. This may be found whenever an owner-operator expects that losses are temporary and that adverse conditions will change. His ability to absorb short-term losses depends upon his access to funds through credit or personal resources not presently utilized.

6. Low (approaching zero) opportunity costs for the fixed assets and for the owner-operator's managerial skills and/or labor. As long as the operator can meet labor and materials costs, he will continue to operate. He may even operate with gross revenues below variable costs until he has exhausted his working capital and credit.

7. Plant site appreciation. This factor is important in those situations where the value of the land on which the plant is located is appreciating at a rate sufficient to offset short-term losses.

These factors are generally associated with proprietorships and closely held enterprises rather than publicly held corporations.

While the above factors are present in and relevant to business decisions, it is argued that common economic rules are sufficient to provide useful and reliable insight into potential business responses to required investment and operating costs in waste management handling.

In the simplest case, a plant will be closed when variable costs (Vc) are greater than revenues (R) since by closing the plant, losses can be avoided.

In a more probable situation, the variable costs are less than revenues but revenues are less than variable costs plus cash overhead expenses (TCc) which are fixed in the short-run. In this situation, a plant would likely continue to operate as contributions are being made toward covering a portion of these fixed cash overhead expenses. The firm cannot operate indefinitely under this condition, but the length of this period is uncertain. Basic to this strategy of continuing operations is the firm's expectations that revenues will increase to cover cash outlay. Identification of plants where variable costs plus cash overhead expenses are greater than revenues, but variable costs are less than revenues leads to an estimate of plants that should be closed over some period of time if revenues do not increase. However, the timing of such closures is difficult to predict.

In another situation, the variable costs plus cash overhead expenses are less than revenues. In this case, it is likely that plant operations will continue if the net present value (NPV_k) of the cash flow 1/ at the firm's (industry) cost of capital (k) is greater than zero. If the net present value is less than zero, the firm could liquidate, realizing salvage value (S) 2/ in cash, and reinvest and be financially better off, assuming reinvesting at least at the firm's (industry) cost of capital.

Computation of net present value involves discounting the cash flow through the discounting function:

$$NPV = \sum_{n=0}^{y} A_n (1 + k)^{-n}$$

where:

NPV = net present value

A_n = the cash flow in the n^{th} year

k = discount rate (after-tax cost of capital)

n = number of conversion periods, i.e., 1 year, 2 years, etc.

y = years

The "cash flow" including waste management related costs is described in the subsequent sections.

Construction of the Cash Flow

The cash flow used in the analysis of hazardous waste management costs was constructed as follows:

1/ Refer to "Construction of the Cash Flow".

2/ Salvage value is defined here as the liquidation value of fixed assets plus working capital.

1. Initial investment taken in year t_0, considered to be outlays for fixed assets and working capital.
2. After-tax cash proceeds taken for years t_1 to t_n.
3. Annual replacement investment, equal to annual current depreciation taken for years t_1 to t_n.
4. Terminal value taken in year t_n.
5. Annual hazardous waste management operating expenses are taken for years t_1 to t_n. No added investment is assumed to be required for hazardous waste management.

Baseline cash flow excludes costs associated with managing hazardous solid waste.

It should be noted that a more common measure of profitability is return on investment (ROI) where after-tax income (as defined in equation below) is expressed as a percent of invested capital (book value) or as a percent of net worth. These measures should not be viewed so much as different estimates of profitability compared to net present value, but rather these should be seen as an entirely different profitability concept.

The data requirements for return on investment and net present value measures are derived from the same basic financial information, although the final inputs are handled differently for each.

In the construction of the cash flow for the net present value analysis, after-tax cash proceeds are defined as:

(1) After-tax income = $(1 - t) \times (R - E - I - D)$

(2) After-tax cash proceeds = $(1 - t) \times (R - E - D) + D$

where

t = tax rate

R = revenues

E = expenses other than depreciation and interest

I = interest expenses

D = depreciation charges

Depreciation is included only in terms of its tax effect and is then added back to obtain after-tax cash proceeds.

There is a temptation to include outlays for interest payments when computing the cash proceeds of a period. Cash disbursed for interest should not affect the cash proceeds computation. The interest factor is taken into consideration by the use of the present-value procedure. To also include the cash disbursement would result in double counting. The effect of interest payments on income taxes is also excluded from the cash proceeds computation. This is brought into the analysis when computing the effective rate of interest of debt sources of capital, which is used in the determination of the cost of capital.

A tax rate of 20 percent on the first $25,000 income, 22 percent on income from $25,001 to $50,000, and 48 percent on amounts over $50,000 was used throughout the analysis. Accelerated depreciation methods, investment credits, carry forward and carry back provisions were not used due to their complexity and special limitations.

Cost of Capital - After-tax

Return on invested capital is a fundamental notion in the U.S. business. It provides both a measure of the actual performance of a firm as well as its expected performance. In the latter case, it is also called the cost of capital and this, in turn, is defined as the weighted average of the cost of each type of capital employed by the firm -- in general terms, equities and interest-bearing liabilities. There is no methodology that yields the precise cost of capital, but it can be approximated within reasonable bounds.

The cost of equity capital is estimated by two methods -- the dividend yield method and the earnings stock price (E/P ratio) method. Both are simplifications of the more complex DCF methodology. The dividend method is:

$$c = \frac{D}{P} + g$$

where

c = cost of equity capital

D = dividend yield

P = stock price

g = growth

The E/P method is simply

$$c = E/P$$

where

c = cost of equity capital

E = earnings

P = stock price

and is a further simplification of the first. The latter assumes future earnings as a level, perpetual stream.

The after-tax cost of debt capital was estimated by using an estimated cost of debt (interest rate) and multiplying it by 0.52 -- assuming a 48 percent tax rate.

$$d = 0.52\ i$$

where

d = after-tax cost of debt capital

i = before-tax cost of debt (interest rate)

The sum of the cost of equity and debt capital weighted by the respective equity to total assets and total liabilities to total assets ratios yields the estimated weighted average cost of capital - after tax (k).

Investment

In evaluating the feasibility of new plants, investment is thought of as outlays for fixed assets and working capital. However, in evaluating closure of an on-going plant, the investment basis is its salvage value (opportunity cost or shadow price) 1/. For this analysis, salvage value was taken as the sum of liquidation value of fixed assets plus working capital (current assets less current liabilities) tied up by the plant. This same amount was taken as a negative investment or "cash out" value in the terminal year.

The rationale for using total shadow priced investment was that the cash proceeds do not include interest expenses which are reflected in the weighted cost of capital. This procedure requires the use of total capital (salvage value) regardless of source. An alternative would be to use as investment, net cash realization (total less debt retirement) upon liquidation of the plant. In the single plant firm, debt retirement would be clearly defined. In the case of the multiplant firm, the delineation of the debt by the plant would likely not be clear. Presumably this

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1/ This should not be confused with a simple buy-sell situation which merely involves a transfer of ownership from one firm to another. In this instance, the opportunity cost (shadow price) of the investment may take on a different value.

could be reflected in proportioning total debt to the individual plant on some plant parameter (i.e., capacity or sales). Under this latter procedure, interest and debt retirement costs would be included in the cash flows.

The two procedures will yield similar results if the cost of capital and the interest charges are estimated on a similar basis. The former procedure, total salvage value, was used as it gives reasonable answers and simplified both the computation and explanation of the cash proceeds and salvage values.

Replacement investment was considered to be equal to the annual depreciation. This corresponds to the operating policies of some managements and serves as a good proxy for replacement in an on-going business.

Again, no investment in hazardous waste management facilities is required as disposal will include payment for a disposal service. This cost will affect return on the normal investment activities but will not create need for additional investment analysis.

Price and Production Impact Analyses

Price and production impact analyses necessarily have to proceed simultaneously. In order to evaluate these impacts, two types of analyses are used: one is at the micro level utilizing the model plant as the basis of the analysis to arrive at required price impacts to maintain profitability levels; the other is at the industry level utilizing supply and demand analysis.

Application of the preceding DCF procedure to these costs yields the present value of hazardous waste management costs (i.e., operating cost less tax savings). If this is known, the price increase required to pay for hazardous waste management can readily be approximated by the formula 1/

$$X = \frac{(PVP)\ (100)}{(1-T)\ (PVR)}$$

where

X = required percentage increase in price

PVP = present value of pollution control costs

1/ The above procedure is conceptually correct where an average tax rate is used. However, to insure accuracy in the machine program where the actual tax brackets are incorporated, a more detailed iterative process is required.

PVR = present value of gross revenue starting in the year pollution control is imposed

T = average tax rate

The required price increase at the plant level is evaluated in light of the price elasticities of the commodity involved and the competitive structure of the industry. This represents the second approach using supply and demand analysis. The supply and demand analysis provides some insights into likely quantities and supply response to different prices. This allows a preliminary estimate of the production and price impact of regulation costs. Following this, further analysis at the micro level is performed to obtain a more detailed insight into the plants' response to expected prices, absorption or shutdown. The indicated plant shutdowns are then aggregated to test whether or not the lost production could be absorbed by the remaining capacity or whether such curtailments would increase prices.

Financial Impact Analysis

The financial impact analysis involves preparation of pro forma income statements and cash flow statements following the assessment of the likely price change. The analysis provides estimates of profitability with and without hazardous waste management costs.

Plant Closures and Production Effects

Plant closures may result from the inability of less profitable plants to adequately recover required waste disposal cost through increased product prices, decreased input prices, or improvements in economic efficiency. Often closures can be anticipated among older, smaller, and less efficient plants as a result of economies of scale which would lower the overall relative costs to a larger operation. Consequently, in the long run, it is expected that the older, smaller, less efficient plants will eventually yield to the dominance of the larger more efficient units. However, in the short run, it is always possible that a plant may continue to operate even when economic considerations indicate closure. Possible exceptions will occur to the extent that smaller high cost plants are protected by regional markets and other non-price impediments to competition from the larger low cost plants.

Employment Impact Analysis

This analysis is concerned with estimating likely employment losses due to curtailed production and/or plant closures as a result of the regulations of concern. If the actual plants which are expected to curtail production and/or close can be identified, employment impacts can be estimated directly. Otherwise the employment impact analysis involves the application of estimates of employment changes by model plants. Employment changes in model plants are then generalized according to the number of actual plants represented by the model plant and aggregated to derive an estimate of total employment effects for the industry. Employment dislocations will be noted as appropriate.

Community Impact Analysis

This task is designed to identify potential impacts on local community economies where the impacted plant might represent a major source of employment and income. This analysis is based on a knowledge of the location of plants, particularly threatened plants, and a general understanding of the economic base of those communities and the relative importance of threatened plants to local economies.

Balance of Payments Impact Analysis

Balance of payments impact analysis deals with those products that have competitive positions with regard to imports and exports. The analysis considers whether or not the estimated price changes would further hinder competitive positions of leather tanners with regard to exports or increase foreign imports. Where important, estimates on the amount of trade that potentially could be impacted and total trade levels are presented.

Other Impact Analysis

Other potential impacts may be created by the imposition of the waste management regulations. This will likely be unique to given industries requiring a case-by-case approach. An illustration of the possible type of impact would be a plant that produces a critical intermediate, an input for other industries. The loss of this plant or large price increases could produce serious backward or forward effects on producers or consumers. To the extent additional impacts are identified and are important, these will be noted.

III. STRUCTURE OF THE INDUSTRY

The Census of Manufactures defines the Leather Tanning and Finishing Industry (SIC 3111) as an industry comprised of establishments primarily engaged in tanning, currying, and finishing hides and skins into leather. The Census classifies the Leather Tanning and Finishing Industry into three types of establishments. These include:

1. "Regular tanneries" - the regular tannery purchases raw materials, employs production workers in the plant to tan, curry and finish hides and skins, and sells the finished product. In effect, this type of establishment performs all of the usual manufacturing functions within one organization.

2. Converter - the converter typically performs only the entrepreneural functions of the manufacturing concern such as buying raw materials, and arranging processing with outside factories, i.e., contract tanneries for the production of the finished leathers. The actual tanning and finishing of hides and skins is done on contract by the contract tanneries. Thus these establishments do not generate solid waste standards.

3. Contract tanneries - the contract tanner employs production workers in his own establishment to process materials owned by converters, makes products to specification but does not become involved in the sale of the finished product.

It should be noted, however, that the above classification is not mutually exclusive since some firms in the industry act as both regular tanners, and leather converters or as regular tanners and contract tanners.

The Census identifies establishments that tan leather, tan and finish leather, and only finish leather. These establishments, furthermore, are one of six types of members of the Tanning; Industrial Leather Goods; and Shoe Industrial Group, SIC 31A. The industrial group members include the following four-digit industries:

- 3111 Leather Tanning and Finishing
- 3131 Boat and Shoe Cut, Stock and Findings
- 3142 House Slippers
- 3143 Men's Footwear except athletic
- 3144 Women's Footwear except athletic
- 3149 Footwear, except rubber N.E.C.

Within the SIC 31A industrial group, the leather tanning industry has the largest number of establishments, fourth highest number of employees and third largest value of shipments of the six four-digit industries listed above.

A. Industry as a Process

The Leather Tanning and Finishing Industry includes processing plants primarily engaged in processing the raw animal hide into usable finished leather. As mentioned previously, the industry is classified into three types of establishments: (1) regular tanneries, (2) converter, and (3) contract tanneries.

The various categories of tanneries help to provide an important link between the raw hides and the Finished Leather Products Industry, by converting the raw hides and skins into usable leather. Figure 2 illustrates many of the interrelationships of the Leather Tanning and Finishing Industry with regards to major supplier and customer industries. As is shown, the Leather Tanning and Industrial Leathers account for approximately 46 percent of the Meat Packing Industry's hides and skins, with the remaining 45 percent being exported. These hides represent approximately 39 percent of the Leather Industry's total expenditures. Other expenditures of the Leather Industry include 42 percent of the total expenditures for materials, chemicals and processing costs and 19 percent for materials and services provided by other establishments classified in the Leather Industry.

Thirty two percent of the Leather Industry's total sales are to establishments which produce other leather products, 19 percent are to other establishments in the Leather Industry and 49 percent of the Industry's sales are to the footwear, except rubber, manufactures. The sale of leather to the footwear manufacture represent 40 percent of the footwear manufactures' total expenditures.

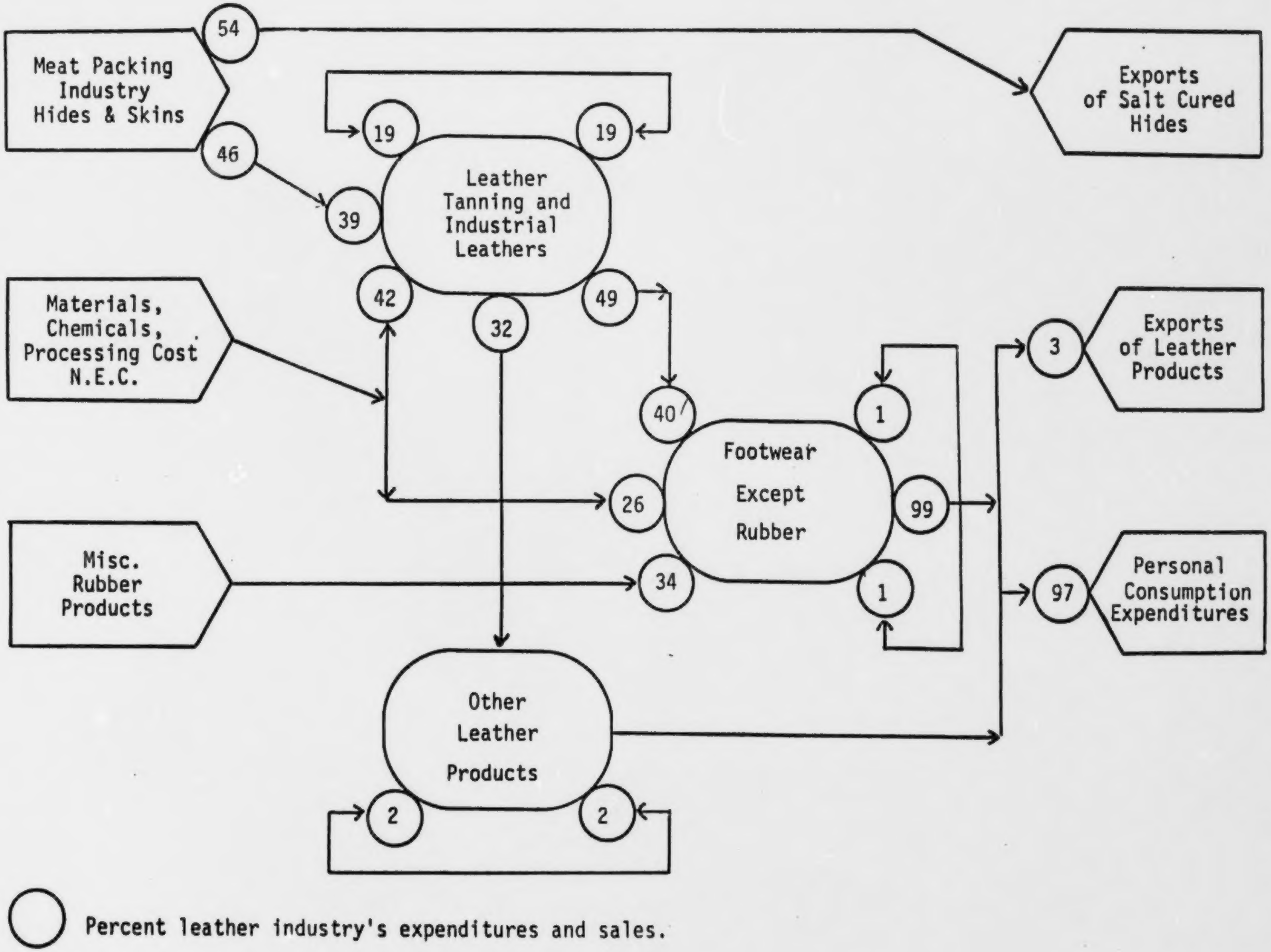
Other interrelationships are also depicted in Figure 2.

B. Characteristics of the Industry

The Leather Tanning and Finishing Industry consists of a wide diversity of types of firms. Firm ownership ranges from family-owned companies and closely held corporations to divisions of relatively large conglomerations. Tanneries vary considerably in size as well as tanning techniques for tanning a variety of hides and skins into several distinct leathers.

Number of Tanneries

The U.S. Department of Commerce has reported the number of establishments in the Leather Tanning and Finishing Industry as follows:



Meat Packing Industry Hides & Skins
54
46
Exports of Salt Cured Hides
19
19
39
Leather Tanning and Industrial Leathers
42
32
49
Materials, Chemicals, Processing Cost N.E.C.
40
26
34
Footwear Except Rubber
1
99
1
Misc. Rubber Products
Exports of Leather Products
3
Personal Consumption Expenditures
97
Other Leather Products
2
2

○ Percent leather industry's expenditures and sales.

Figure 2. Leather Tanning and Finishing Industry, Sales and Expenditures.
Source: U.S. Department of Commerce, Industrial Outlook, 1975.

Year	Number of Establishments
1963	525
1967	519
1972	517
1973	490
1974	484
1975	441
1976	430

Table 1 shows the total number of establishments in the Leather Tanning and Finishing Industry by classification for 1967 and 1972. The Census has used the primary plant operation as the delineating classification criteria. If the direct wage and salary payments for one category were less than the payments for the second, the plant was classified according to the category in which the higher amount of wage and salary payments were made. In 1972, 58 percent of the establishments were classified as tanneries, 15 percent as converters, and 27 percent as contract tanneries.

A tabulation by the Tanners' Council of America indicates a total of 431 plants (including converters) in the industry as of 30 June, 1973. Their records also indicate a total of 19 plants (establishments) have ceased operations between the period of 1 July 1973 and 31 December 1975. This would result in 412 plants being in operation at the end of 1975. It is believed that the difference in the number of plants reflects a difference in method of classification with the Department of Commerce data including miscellaneous small operators, many of which would be classified as taxidermist by the Tanners' Council rather than tanners or finishers.

All the establishments reported by the Department of Commerce would not be impacted by solid waste treatment requirements. Based on industry surveys, industry contacts, and segmentation of DOC data, the probable number of solid waste generating plants is estimated at about 250. Those not impacted would include brokers, warehousers, hobbyists and taxidermists to name a few. The segmentation of the total industry is given below for all SIC 3111 plants.

Segmentation of SIC 3111 - 1976

Segment	No. of Establishments (Plants)	
Wet tanneries	188	
Dry tanneries (Leather Finishers)	60	
Plants w/solid waste		248
Leather Converters	65	
Other Non-production Plants*	∿ 130	
Plants w/o solid waste		∿ 195
TOTAL - SIC 3111		430

* Includes brokers, dealers, sales organizations, warehousers, taxidermists, hobbyists, and others.

Table 1. Total number of establishments in the Leather Tanning and Finishing Industry by classification

	Total	Tanneries	Converter	Contract Tanneries
1967				
No. of establishments	519	314	70	135
With 1 - 19 employees	261	163	52	46
With 20 - 99 employees	171	91	13	67
With 100 employees or more	87	60	5	22
1972				
No. of establishments	517	301	76	140
With 1 - 19 employees	294	154	64	76
With 20 - 99 employees	148	89	8	51
With 100 or more employees	75	58	4	13

Source: U.S. Department of Commerce, Census of Manufactures, 1967 and 1972.

Size of Tanneries

Based on number of employees, an indication of plant size is available from the Census of Manufactures (Table 1). These data are restricted to the years 1967 and 1972, but are reflective of general industry characteristics. Plant size appears to have remained relatively constant between the period of 1967 and 1972. In 1972, 57 percent of the total plants had less than 19 employees. This is an increase from 50 percent in 1967. In 1972, 29 percent of the plants employed between 20 and 99 employees and 14 percent had 100 employees or more.

However, tanneries of concern to this study will be reported in a different fashion. Instead of utilizing number of establishments for various employment groups, the tanners are disaggregated according to various size categories of their daily capacity expressed in cattlehide equivalents. These categories, as well as the number of associated wet tanneries, are depicted below:

Daily Capacity (cattlehide equivalents)1/	Number of Tanners	Percent
Less than 300	46	19
300 - 699	80	32
700 - 1,199	64	26
1,200 - 1,999	33	13
2,000 or more	25	5
	248	100

1/ One cattlehide equivalent equals 40 square feet of leather.

As can be seen, the tanners that are potentially impacted are somewhat more evenly distributed according to size than are all the establishments of the Census data, tanners and non-tanners. However, as was the case for the Census data, the smaller size categories do represent a larger portion of the tanneries than the larger categories.

Types of Major Products

Six major categories of animal skins are used today in addition to imported rare skins such as kangaroo, etc. They are as follows: cattlehides, kipskins and calfskins; sheep and lamb skins; goat and kidskins; pigskins; horsehides; and deer and elk skins.

The products of the industry can be identified in traditional terms based upon primary raw materials employed and end use.

CATTLEHIDES:

CATTLE SIDE LEATHER. This is the principal product of the industry which accounts for approximately 67% of total industry sales. End use includes--shoe uppers, linings, garments, gloves, sporting goods, handbags, small leather goods, and waist belts. Side leather is primarily chrome tanned.

CATTLE SIDE SPLIT LEATHER. Cattle side split leather is a by-product of hides which is not processed in full thickness. Used for shoe uppers, linings, insoles, work gloves, small leather goods, handbags, protective industrial clothing. Chrome tanned; processed by side leather tanners or sold to "split tanners" for finishing into specialized products.

SOLE LEATHER. Almost entirely vegetable tanned. Major use is for shoe soles. Secondary uses include welting, counters, box toes, waist belts.

CATTLE SIDE PATENT LEATHER. Sub-class of chrome tanned cattle sides finished with special compounds (polyurethanes) for glossy surface.

KIP SIDE LEATHER. Leather tanned from kips which are small hides, intermediate between calfskins and cattlehides. Used almost entirely for shoe uppers.

UPHOLSTERY LEATHER. Mainly vegetable tanned; some chrome retannage. End use includes automotive and furniture upholstery.

HARNESS AND SADDLERY LEATHER. Composite group of the same plants but possessing different characteristics useful for various parts of equine equipage or related uses. (Collar, harness, skirting, latigo, bridle, etc.) Also used for holsters, gun cases, etc.

SPORTING GOODS LEATHER. Combination tannages of chrome, vegetable, alum, glutaraldehyde used for footballs, baseballs, baseball gloves and laces.

BAG, CASE AND STRAP LEATHER. Trade description for specialized group of leathers which are vegetable, chrome and combination tanned. End use includes luggage, briefcases, small leather goods, decorative items, equipment cases, straps, and heavy bookbinding.

MECHANICAL LEATHER. Vegetable, chrome and impregnated leather for industrial uses including belting, gaskets, washers, seals for equipment.

CALFSKINS. Chrome tanned leather from skins of immature cattle used for shoe uppers and handbags. Volume is in sharp decline due to shrinkage of raw material supply.

SHEEP AND LAMB SKINS:

Second largest raw material category. Chrome alum, oil and combination tannages for garments, gloves, shoe uppers and linings, handbags and wallets, bookbinding and chamois.

GOAT AND KID LEATHER SKINS:

Chrome tanned in smooth or suede finish used for shoe uppers and linings.

PIGSKIN:

Vegetable or chrome tanned shoe uppers, gloves, garments, and small leather goods.

HORSE HIDES:

Chrome and vegetable processed for shoe uppers, garments, baseballs. Cordovan is included in this group.

DEER AND ELK HIDES:

Chrome and vegetable tanned for gloves, garments, and to a minor degree for shoe uppers (buckskin).

MISCELLANEOUS AND EXOTIC LEATHERS:

Aggregate volume is minor and the number of producers in the U.S. is less than 10. Products include Kangaroo for athletic shoe uppers, reptile for shoe uppers, belts, and small leather goods, Peccary and Carpincho for gloves.

In summary, cattlehides are the dominant raw material of the industry with the major products of Cattle Side leather, Sole leather, Upholstery, Garment and Bag, Case and Strap leathers. Sheep and Lamb skins are the second and much smaller raw material base yielding mainly garment and glove leather, lining and shoe stock, chamois and leather for small leather goods.

Value of Shipments

Value of shipments and other receipts of the Leather Tanning and Finishing Industry in 1972 totaled $1,059.5 million. This included shipments of tanned and finished leather (primary products) valued at $1,018.2 million, shipments of other products (secondary products) valued at $11.2 million, and miscellaneous receipts (mainly resales) valued at $30.1 million.

Estimates of the 1977 value of shipments are expected to total $1,730 million, 8.1 percent above the shipments of 1976 and 38.7 percent above the 1972 value of shipments (Table 2). Historically the value of shipments have fluctuated from year to year, however, the overall average annual increase has been 5.1 percent since 1960.

Table 2. The Leather Tanning and Finishing Industry, Value of Shipments, 1960 to 1976

Year	Value of shipment (mil. $)	Percentage change (%)
1960	790.7	--
1961	761.1	-3.7
1962	765.9	-0.6
1963	758.4	-1.0
1964	783.6	3.3
1965	856.7	9.3
1966	940.5	9.8
1967	870.1	-7.5
1968	877.9	0.9
1969	853.9	-2.7
1970	794.4	-7.0
1971	838.3	5.5
1972	1,059.5	26.4
1973	1,082.0	2.1
1974	1,075.5	-0.6
1975	1,184.0	10.1
1976 */	1,600.0	35.1
1977 */	1,730.0	8.1

*/ Estimated

Source: Department of Commerce, Bureau of the Census and Bureau of Labor Statistics, BDC, U.S. Industrial Outlook, 1977.

Shipments of tanned and finished leather (primary products) in 1972 represented 99 percent (specialization ratio) of the industry's total product shipment. The industry specialization ratio in 1967 was 98 percent. Secondary products shipped by the industry in 1972 consisted mainly of boot and shoe cut stock and findings ($2.5 million).

Shipments of tanned and finished leather from establishments classified in industry SIC 3111 in 1972 represented 99 percent (coverage ratio) of these products valued at $1,026.4 million shipped by all industries. In 1967, the coverage ratio was also 99 percent. Thus for all practical purposes, it can be concluded that all establishments of tanning and finishing leather are classified in industry SIC 3111.

Location of Tanneries

Leather tanning and finishing establishments tend to be concentrated in the Northeastern region of the country. As shown in Table 3, 62 percent of the total number of establishments were located in the area in 1972. Massachusetts ranked first, in total number of plants; New York second; and New Jersey third, with 25, 19, and 8 percent respectively.

The second area of concentration is the East North Central region with Wisconsin reporting 22 plants or 4.3 percent of the total. Other states of importance in this region include Ohio, Illinois, and Michigan. The remaining plants are scattered widely throughout the United States.

Historically, tanneries were established where there was an adequate supply of hides, water and tanning materials (i.e., tree bark). This began in New England and the Mid-Atlantic states and followed the cattle herds west, though with a long time delay. As indicated above, tanneries are still located in New England and Chicago as well as in the dairy country of Wisconsin. However, with the recent spatial dispersion of slaughter facilities away from the traditional centers such as Chicago and Kansas City, it is expected that in time new tanneries will follow the same trend and locate near the supply of hides.

The locations of all the wet and dry tanneries; excluding converters, brokers, etc.; are difficult to pinpoint as adequate data are not presently available. However, based on survey responses approximately 62 percent of the wet and dry tanners, are located in the New England states; 8 percent were located in the Southern states; 21 percent are located in the Midwest; and the remaining 9 percent are located in the Western and Southwestern states.

If these percentages are extrapolated for all 248 wet and dry tanneries, the locational breakdown appears as follows:

Area	Number of Tanneries			Percent of all Tanneries
	Wet	Dry	Total	
New England	101	52	153	61.7
South	19	2	21	8.5
Midwest	47	5	52	21.0
West and Southwest	21	1	22	8.9
Total	188	60	248	100.0

Table 3. Location of Leather Tanning and Finishing establishments by primary state and region, 1967, 1972

Region	1967				1972			
	Total Industry		Establishments with 20 or More Employees		Total Industry		Establishments with 20 or More Employees	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Northeast Region					324	62.7	132	59.2
New England Division	183	35.3	93	36.0	163	31.5	78	35.0
Maine	16	3.1	14	5.4	15	2.9	10	4.5
New Hampshire	18	3.5	15	5.8	19	3.7	14	6.3
Vermont	1	0.2	1	0.4	1	0.2	1	0.4
Massachusetts	146	28.1	62	24.0	128	24.7	53	23.8
Other	2	0.4	1	0.4	--	--	--	--
Middle Atlantic Division	176	33.9	68	26.4	161	31.1	54	24.2
New York	108	20.8	30	11.6	98	19.0	26	11.7
New Jersey	48	9.2	25	9.7	43	8.3	15	6.7
Pennsylvania	20	3.9	13	5.1	20	3.9	13	5.8
North Central Region					84	16.2	48	21.5
East North Central Division	74	14.2	51	19.8	62	12.0	39	17.5
Ohio	12	2.3	7	2.7	8	1.5	4	1.8
Illinois	19	3.6	12	4.7	19	3.7	10	4.5
Michigan	10	1.9	5	1.9	8	1.5	4	1.8
Wisconsin	30	5.8	24	9.3	22	4.3	19	8.5
Other	3	0.6	3	1.2	5	1.0	2	0.9
West North Central Division	13	2.6	7	2.7	22	4.2	9	4.0
Minnesota	2	0.4	1	0.4	4	0.8	2	0.9
Missouri	6	1.2	5	1.9	NA	NA	NA	NA
Iowa	NA	NA	NA	NA	6	1.1	4	1.8
Other	5	1.0	1	0.4	12	2.3	3	1.3
South Region					59	11.4	27	12.1
South Atlantic Division	26	5.0	18	7.0	27	5.2	14	6.3
Delaware	6	1.1	6	2.3	2	0.4	2	0.9
Maryland	2	0.4	1	0.4	1	0.2	1	0.4
Virginia	4	0.8	4	1.6	5	1.0	3	1.3
West Virginia	4	0.8	4	1.6	4	0.8	4	1.8
North Carolina	2	0.4	2	0.7	5	1.0	2	0.9
Georgia	2	0.4	1	0.4	2	0.4	1	0.4
Other	6	1.1	0	--	7	1.4	1	0.4
East South Central Division	12	2.3	10	3.9	12	2.3	10	4.5
Kentucky	3	0.6	3	1.2	3	0.6	3	1.3
Tennessee	9	1.7	7	2.7	8	1.5	7	3.2
Other	--	--	--	--	1	0.2	NA	--
West South Central Division	9	1.7	2	0.8	20	3.9	3	1.3
Texas	7	1.3	2	0.8	15	2.9	3	1.3
Other	2	0.4	0	--	5	1.0	NA	--
West Region					50	9.7	15	7.2
Pacific Division	26	5.0	9	3.5	42	8.1	14	6.3
California	15	2.9	8	3.1	33	6.4	13	5.8
Other	11	2.1	1	0.4	9	1.7	1	0.5
TOTAL	519	100.0	258	100.0	517	100.0	223	100.0

NA - Not Available

Source: U.S. Department of Commerce, Census of Manufactures, 1967 and 1972.

Age of Plants and Level of Technology

The Leather Tanning and Finishing Industry can be described as having basically old plants in terms of actual brick and mortar with slightly over 70 percent of the plants 50 years of age or older. From the membership records of the Tanners' Council, the age of tanning and/or finishing leather plants, excluding converter, is as follows:

	Percent of Members
Less than 10 years	1
10-15 years	1
15-20 years	3
20-30 years	5
30-50 years	19
Over 50 years	71
Total	100

Although the majority of industry units are in old buildings, a substantial number of plants have been rebuilt, modernized and re-equippped at a cumulative cost approaching the capital investment required for new plants. Most plants have made major changes since 1960, although technology changes over the last fifty years have been minimal.

C. Importance of Integrated Capacities

The industry is not characterized by any appreciable integration either back to the raw material supply or forward to finished or fabricated leather products. There is, in fact, less integration today than several years ago when two major packers owned tanning facilities and four leading shoe manufacturers operated tanneries. It is estimated that the sales volume of tanning or finishing establishments integrated with raw material producers is very small, less than five percent of gross annual volume. Leather tanning facilities owned or operated by manufacturing companies account for equally as small percentage of leather sales or value.

D. Level of Diversification

The Census of Manufactures shows the Leather Tanning and Finishing Industry with a very high specialization ratio of 99 percent for 1972. This indicates that 99 percent of sales are in the primary SIC code. The typical production unit of the industry is not diversified for two main reasons. First, tanning equipment and processes are specialized and non-interchangeable in terms of raw materials or end product. Hence, most plants have confined production to a very limited range of product.

Second, shoe manufacturing has been and still is the principal consuming industry. In 1962, shoes accounted for 83 percent of all leather used. By 1972 this ratio had declined to 74 percent, and tanneries were seeking to diversify output. Cattle side leather plants entered the garment leather market and sought outlets in waist belts, handbags or small leather goods. However, this trend does not reflect diversification of basic product line. It indicates rather, an effort to adapt available plants and equipment to moderately different needs of end uses other than shoes.

A further observation is pertinent. Tanning machinery and equipment cannot be adapted for any purpose other than treating hides and skins. It is fixed capital which must be written off at scrap value in the absence of demand for used machines.

E. Employment Characteristics

Employment

Total employment within the Leather Tanning and Finishing Industry has decreased by about 19 percent since 1965, declining from 32,000 employees in 1965 to 26,000 employees in 1976 (Table 4). However, employment was up in both 1975 and 1976 from an eleven year low of 22,000 in 1974. Of the total employees in 1976, production workers represented approximately 88 percent or about 23,000 individuals. For the period 1965 to 1974, the number of production workers in the industry had declined by over 34 percent, from 27,900 to 18,300 people.

Modest increases have occured in the last two years and the number of production workers in 1976 is 25 percent over the low 1974 level. The Leather Tanning Industry employs unskilled, semi-skilled and skilled labor dependent on the requirement of the task being performed. Tanneries can be either union or non-union shops with the number of tanneries in each category being about equal.

Production workers average approximately 1,900 hours per year which represents 230 to 250 employed days per year. With respect to the production workers productivity, Table 4 depicts the average number of hours required to produce one cattlehide equivalent. As shown in the table, this productivity measure has varied from year to year but has remained reasonably close to 1.7 hours per hide since 1965.

Level of Wages

In 1974, the latest data available, the total industry's payroll amounted to $194.3 million. The total wages paid to production workers for the same year totaled $141.4 million or about 73 percent of the industry's total payroll.

Table 4. The Leather Tanning and Finishing Industry, Employment Characteristics

Year	All Employees		Production Workers					
	Number	Payroll	Number	Wages	Annual Hours/Worker	Annual Wages/Worker	Ave. Hourly Rate	Ave. Hours Per Equiv. Hide
	(1000)	(mil. $)	(1000)	(mil. $)	(Hours)	(Dollars)	(Dollars)	(Hours)
1965	32.0	180.0	27.9	139.0	2,039	4,982	2.44	1.74
1966	32.7	189.2	28.2	144,4	2,039	5.121	2.51	1.78
1967	30.7	186.4	26.4	142.5	2,000	5,398	2.70	1.71
1968	31.1	196.0	26.7	151.2	1,985	5,663	2.85	1.66
1969	28.8	188.1	24.4	142.8	1,943	5,852	3.01	1.67
1970	24.1	171.5	20.4	129.8	1,980	6,363	3.21	1.56
1971	24.5	183.9	20.7	137.6	1,976	6,647	3.36	1.62
1972	25.7	200.0	22.1	151.3	1,896	6,846	3.61	1.70
1973	23.4	186.5	19.8	138.2	1,909	6,980	3.66	1.79
1974	22.0	194.3	18.3	141.4	1,934	7,727	4.00	1.78
1975	23.0	N.A.	20.0	N.A.	N.A.	N.A.	N.A.	N.A.
1976	26.0	N.A.	23.0	N.A.	N.A.	N.A.	N.A.	N.A.

N.A. is defined as Not Available.
Source: U.S. Department of Commerce, Bureau of the Census.

Annual wages per production worker averaged $7,727 in 1974 which represented an increase of 55 percent over the last 10 years. During this same period, the average hourly rate increased by 64 percent from $2.44 per hour in 1965 to $4.00 per hour in 1974.

F. Ownership Type and Size

The Leather Tanning and Finishing Industry consists of a wide diversity of types and sizes of firms. Firm ownership ranges from family owned companies and closely held corporations to divisions of large conglomerates. However, the majority of the tanneries would fall into the family-owned or closely held corporation group. This is attributable to the fact that most tanneries are relatively small and were established years ago by either a family or a small gorup of individuals who have remained in control of the operation.

G. Industry Segments

The Leather Tanning and Finishing Industry has traditionally been segmented by type of leather manufactured such as cattlehide leathers, sheep and lamb skins, goat skins, etc. Most of the industry production data are given in these terms. However, categorization of the industry by manufacturing processes is more appropriate for evaluating the impact of solid waste handling on the industry since a major factor affecting the waste production in the leather industry is the type of manufacturing process used to convert the various types of animal skins to finished leathers.

The following material discusses industry segments using two taxonomies: (1) conventional industry segments, and (2) categorization of plants by manufacturing process.

Conventional Industry Segments

Cattlehide leathers accounted for 81.3 percent of the total 1972 production in the leather tanning and finishing industry. The major use of cattlehide leathers is side and patent leather used for shoe uppers. This accounted for 48 percent of total leather or 59 percent of the cattlehide processed. Sheep and lamb skins were the second most important with approximately 10 percent of the 1972 production (Table 5).

Categorization of Plants by Type of Manufacturing Process

For the purposes of evaluating solid waste handling methods, the leather Tanning and Finishing Industry has been divided into seven major categories These categories generally correspond to those developed by SCS Engineers principally by similarities in process and waste loads. The industry categories are:

Table 5. Percent of production and employment by conventional industry segment, 1972.

Industry Segment	Percent of industry production	Percent of industry employment
Cattlehide Leathers	81.3	80.7
Side and Patent	47.8	52.6
Sole and Belt	9.4	11.4
Upholstery	4.7	6.9
Split Leather	10.9	5.3
Harness	0.1	
Bag, Case & Strap	1.8	4.5
Other[1]	6.6	
Calf Leather	1.1	2.0
Goat and Cabretta	2.3	1.8
Sheep and Lamb	10.3	7.7
Pig	4.6	4.5
All Other[2]	0.4	3.3
Converters	n.a.	n.a.
	100.0	100.0

---

[1] Includes sporting goods and mechanical

[2] Includes horse, kangaroo, deer, reptile and exotic types.

Source: Tanners' Council of America, Inc.

1. Cattlehide-chrome--a tannery that primarily processes raw or cured cattle or cattle-like hides into finished leather using chrome tanning. Hide hair can either be chemically dissolved or saved.

2. Cattle-nonchrome (primarily vegetable)--a tannery that primarily processes raw or cured cattle or cattle-like hides into finished leather using less than 20 percent (by hide weight) chrome tanning; includes vegetable, and also alum, syntans, oils, and other methods and their combinations. Many of these plants will not be impacted by hazardous waste management regulations.

3. Cattle-to-blue--a tannery that primarily processes raw or cured cattle or cattle-like hides through the blue-tanned state only, with no retanning or finishing operations, and uses chrome tanning.

4. Cattlehide-splits--a tannery that primarily processes splits or previously tanned hides and/or skins into finished leather, the major wet process consisting of trimming, resplitting, retanning, coloring, and fat-liquoring.

5. No beanhouse (NB) tannery--a tannery that primarily processes hides and/or skins, with the hair previously removed, into finished leather using either chrome or nonchrome tanning methods, primarily includes pickled sheepskins and cattlehides and pigskins.

6. Shearlings--a tannery that primarily processes raw or cured sheep or sheep-like skins, with the wool or hair retained on the hide, into finished leather using chrome or nonchrome tanning; or, a wool pullery--a plant that processes hair-on raw or cured sheep or sheep-like skins by first removing the wool and then pickling the skin for use by a sheepskin tannery (Category 5).

7. Leather finishers--an establishment that receives unfinished leather to which it applies a finish and may also buff to remove imperfections; does not perform any other tanning functions; normally performs on a contract basis offering a service to customers.

A brief description of the major processes are given here. More detailed descriptions are available in published technical descriptions of the tanning and finishing processes.

The major processes are:

1. BEAMHOUSE

   This is a generic term for all the initial stages of process after raw hides and skins are received at the tannery. The beamhouse entails large use of water and is a major source of tannery waste loads regarding sludge.

2. TANYARD

The series of steps by which putrescible hides and skins are converted into stable, non-putrescible leather utilizing aqueous solutions containing various chemical agents.

3. RETANNING, FAT LIQUORING AND COLORING

In these process stages the specified physical properties of leather are adjusted and set prior to surface treatment. Waste loads are substantially reduced from the previous steps and processes.

4. FINISHING

Devoted largely to surface appeal and characteristics. Most important characteristic with respect to waste loads are trimmings and buffing dust.

Table 6 depicts an estimation of the number of tanneries by size and by general categories. Because of the limitations of available data no further breakdown of the tanneries by category could be realistically attempted.

Table 6. The Leather Industry, Wet Tanners by Type and Size

Size	Industry Total	Cattle Chrome	Cattle Non Chrome (primarily vegetable)	Cattle Splits (Retan)	Cattle to Blue	Shearling Chrome (includes sheepskin)	Other	Leather Finishers (Dry)
(Daily Capacity in Cattlehide Equivalents)								
0-299	45	15	9	2		16	3	
300-699	80	27	8	2		7	1	35
700-1,199	64	21	4	7		7	0	25
1,200-1,999	32	22	5	4		0	1	
2,000 or more	27	20	2	0	3	2	0	—
Total	248	105	28	15	3	32	5	60

Source: Industry Survey

IV. FINANCIAL CHARACTERIZATION OF THE INDUSTRY

Information reflective of the financial characteristics of the Leather Tanning and Finishing Industry is particularly difficult to obtain. The industry primarily consists of family-owned businesses or relatively small privately-held corporations. As such, published information regarding the financial position of the industry are not readily available. Limited data are available from the Internal Revenue Service but these data are relatively old (1972-74) and represent the aggregated Leather and Leather Products Industry. Some more recent data are available from Robert Morris Associates' Statement Studies, but these represent financial information from less than 40 different statements.

Information used to develop this chapter on the financial profile of the industry draws on the above named sources where applicable. Additional information was obtained from the U.S. Department of Agriculture, U.S. Department of Commerce, responses to the data collection portfolio as well as discussions with persons knowledgeable of the Leather Tanning and Finishing Industry.

A. General Financial Situation

The Leather Tanning and Finishing Industry in the United States has experienced a somewhat volatile financial situation in recent years. The industry declined steadily in terms of number of plants, volume and profits from the mid 60's on and reached a low in 1972 and 1973. Beginning in 1974 and continuing through 1975 and 1976, the industry experienced a much brighter market situation.

The volatility of the industry varies from firm to firm as well as differing for the various types of tanneries and their respective leather products. Causes of this volatility are primarily resultant of changes in the volume of leather sold as well as competition from foreign countries for both raw hides and the market for leather and leather products. With the exception of 1968, the United States Leather Industry's total production declined every year from 1965 to 1974, decreasing from 32.7 million cattlehide equivalents in 1965 to 20.0 million in 1974 (Table 7). However, in 1975 and 1976 the industry did increase its annual production over the previous year. In 1975, the annual production increased by 9.5 percent over the 1974 quantity produced and 1976 production, equal to 23.5 million hide equivalents, increased 7.5 percent over the 1975 production.

As shown in Table 7, the industry's value of shipments have been much more volatile than the annual production quantitites. From 1966 to 1970, the industry's value of shipments generally declined. Shipments then increased from 1971 to 1973; decreased in 1974; and then increased in 1975 and 1976. Again according to the U.S. Department of Commerce estimates, the value of shipments for 1976 are expected to increase from $1,184 million in 1975 to $1,600 million in 1976, an increase of 35 percent.

4

Table 7. The Leather Tanning and Finishing Industry, production and value of shipments, imports, and exports in current and real dollars, 1965-1976.

Year	Total industry production 1/	Value of industry shipments 2/		Value of leather imports 1/		Value of leather exports 1/	
	1,000 equiv hides	current	real 3/	current	real	current	real
		million dollars					
1965	32,697	857	1,153	67	90	39	52
1966	32,252	940	1,226	75	98	42	55
1967	30,861	870	1,101	68	86	42	53
1968	31,884	878	1,063	81	98	45	54
1969	28,388	854	985	86	99	42	48
1970	25,941	794	869	87	95	37	40
1971	25,267	838	873	83	86	43	45
1972	24,661	1,060	1,060	139	139	67	67
1973	21,062	1,082	1,021	127	120	83	78
1974	19,998	1,076	843	125	107	102	88
1975	21,894	1,184	930	88	69	140	110
1976	23,526	1,600*	1,200*	181*	135	139*	104

Sources: 1/ Tanners Council of America, Inc., Membership Bulletin Leather Industry Statistics, 1977 Edition.

2/ U.S. Department of Commerce, Annual Survey of Manufacturers and U.S. Industrial Outlook.

3/ Real dollars based on Implicit GNP Deflator (1972=100).

* Preliminary

The recent upturn in the economic condition may be attributed primarily to the increase in consumer demand for natural leather and leather products. This has been dampened by the influence of foreign tanneries on domestic supply of raw leather and further expansion of imported leather products to the United States.

Over the past decade consumer acceptance of synthetics as a substitute for leather particularly for womens' and childrens' shoes and handbags has become particularly widespread. Also the decline of leather soles has dropped to 13 percent of the shoes manufactured in 1975. As a result a significant portion of the market previously held by leather was lost to synthetic products. During the past few years, consumers have developed an increased appreciation for natural leather products. Accordingly leather increased its share of the appropriate products' market. However, this increase was not totally absorbed by the United States tanners as much of this increased demand was met by imported leather and leather products.

As shown in Table 7, the value of leather imports steadily increased from 1965 to 1971. In 1972 the value of imports increased by 66 percent over the value of imports in 1971. Much of this increase was absorbed by the increased demand created by the greater appreciation of leather by consumers mentioned above. After 1972, the value of leather imports slowly declined with a significant, 29 percent, drop between 1974 and 1975. But in 1976, imports rebounded to record levels, estimated to value $181 million. When these trends are compared to the total industry production it becomes apparent the values of leather imports are to a degree inversely related to the total industry production. That is, while the values of imports increased, the total domestic production of the industry decreased. Thus the Leather Industry's volume of production has fluctuated in recent years with the major cause being competition from foreign tanners.

B. Cost Structure of the Industry

Revenues

For 1976, the Leather Tanning and Finishing Industry had estimated shipment valued at $1,600 million (Figure 3). This estimate represents an increase of about 35 percent over the value of shipment for 1975. Historically the industry's values of shipments have fluctuated from year to year, however, since 1970, shipments have increased for every year except 1974 at which time shipments decreased 9.4 percent over the value in 1973.

In addition to experiencing a general slump in production prior to 1975-76, the real value of the industries production has declined noticeably. From 1966, when the real value of shipments 1/ was $1,225 million (Figure 3), real revenues nave fallen to as low as $843 million in 1974; a 31 percent decrease over eight years. This decline in real terms mirrors a decline in production which is attributable to a variety of factors, most significant being demand lost to foreign tanners.

1/ $\frac{\text{Value of Industry Shipment}_i}{\text{Implicit GNP Deflator}_i}$, where i = year

(1972 = 100.0)

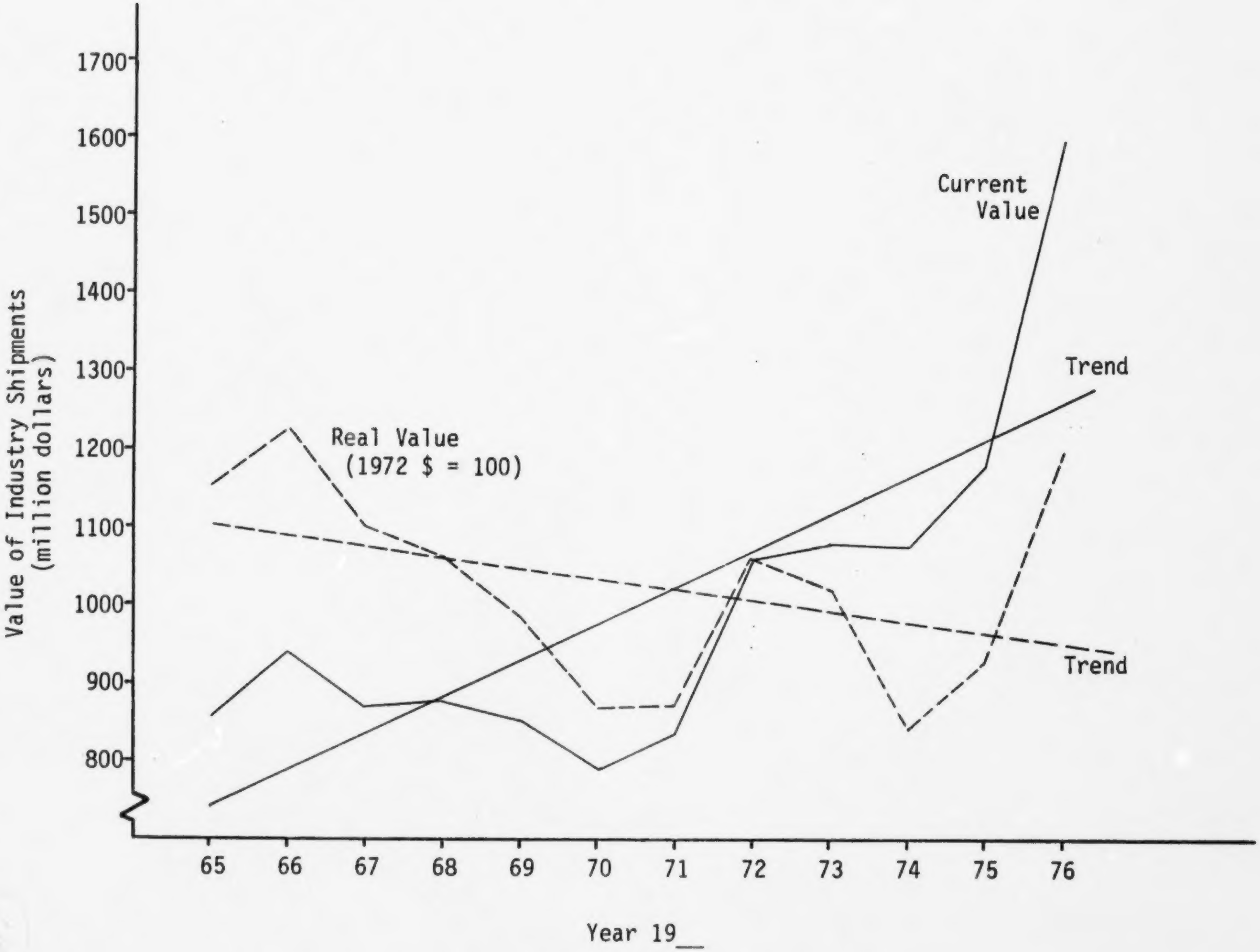


Figure 3. Value of industry shipments, leather tanning and finishing industry, current and real dollars, 1965-1976.

The 1976 value of shipment for the industry was based on information provided by 430 establishments. This gives the value of shipment for the average tannery to be $3.7 million with the average annual production being almost 60,000 cattle hide equivalents (Table 8). This compares to an average value of shipments of $2.7 million in 1975, $2.0 million in 1972, and $1.7 million in 1967. Average production per establishment was 50,000 cattle hide equivalents in 1975, 48,000 in 1972, and 59,000 in 1967.

Variable Costs

Within the Leather Tanning Industry, variable costs represent approximately 80 percent of the total sales. These costs include expenditures for raw hides and/or skins, labor, tanning materials, and miscellaneous other direct costs. According to a survey of the industry, hides and skins represent 37.2 percent of the sales dollar, tanning materials, 14.3 percent, labor, 15.1 percent and miscellaneous expenditures, 12.4 percent. These sum to 79 percent of the sales dollar.

The only time series available depicting the distribution of the sales dollar is available from the Department of Commerce and is somewhat limited in its disaggregation. These data are shown in Table 9 and as can be seen in the table, raw materials, primarily hides, have represented about 60 percent of the sales dollar.

Fixed Costs

Fixed costs are defined as those which do not vary with the level or quantity of production. These include:

Sales, general and administrative
Plant and labor overhead
Taxes and insurance
Maintenance and repair

Data are not available to discuss each of the above costs separately, therefore, fixed costs were grouped. Fixed costs vary from firm to firm however, they usually represent 10 to 15 percent of sales.

Interest is considered a fixed cost although it is somewhat influenced by the total sales. For the Leather Industry interest usually amounts to 1 to 2 percent of sales. As shown in Table 10, interest costs vary with different sizes of operations. Although there are exceptions, it appears that the larger sized tanneries have a greater portion of their sales dollar consumed by interest.

Depreciation is also considered a fixed cost. Typically it represents between 5 and 10 percent of the firms total fixed assets. This would represent an expected asset life between 10 and 20 years.

Table 8. The Leather Tanning and Finishing Industry, total and per establishment data, selected years 1963 to 1976.

Item	Units	Year 1963	1967	1972	1975	1976
Establishments	No.	525	519	517	441	430
VALUE OF SHIPMENTS						
Industry	$1,000	758,000	850,000	1,060,000	1,184,000	1,600,000
Per establishment	d.o.	1,440	1,680	2,050	2,685	3,720
VALUE ADDED						
Industry	d.o.	273,000	319,000	368,000	N.A.	N.A.
Per establishment	d.o.	520	615	710	N.A.	N.A.
PRODUCTION						
Industry	1,000 equiv. hides	31,325	30,861	24,661	21,894	25,526
Per establishment	d.o.	60	59	48	50	59
EMPLOYEES						
Industry	No.	31,400	30,700	25,700	22,000	26,000
Per establishment	d.o.	60	59	50	50	60

Source: U.S. Dept. of Commerce and Tanners Council of America.

Table 9. The Leather Tanning & Finishing Industry, Distribution of the Sales Dollar.

	TOTAL SALES		RAW MATERIALS		PAYROLL		OTHER INDIRECT OPERATING COSTS, TAXES & PROFITS	
	Million Dollars	Percent	Million Dollars	Percent	Million Dollars	Percent	Million Dollars	Percent
1965	856.7	100.0	535.6	62.5	180.0	21.0	141.1	16.5
1966	940.5	100.0	614.1	65.3	189.2	20.1	137.2	14.6
1967	870.1	100.0	547.0	62.9	186.4	21.4	136.7	15.7
1968	177.9	100.0	524.5	59.8	196.0	22.3	157.4	17.9
1969	853.9	100.0	514.9	60.3	188.1	22.0	150.9	17.7
1970	794.4	100.0	471.4	59.3	171.5	21.6	151.5	19.1
1971	838.3	100.0	498.5	59.5	183.9	21.9	155.9	18.6
1972	1059.5	100.0	708.0	66.8	200.0	18.9	151.5	14.3
1973	1081.5	100.0	744.3	68.8	186.5	17.3	150.7	13.9

Source: Department of Commerce, Bureau of the Census, Census of Manufacturers.

Table 10. The Leather Industry, Interest as a Percent of Sales (Business Receipts).

FISCAL YEAR	ASSET SIZE ($000)											
	ZERO ASSETS	OVER ZERO UNDER 100	100 UNDER 250	250 UNDER 500	500 UNDER 1000	1000 UNDER 5000	5,000 UNDER 10,000	10,000 UNDER 25,000	25,000 UNDER 50,000	50,000 UNDER 100,000	100,000 UNDER 250,000	INDUSTRY TOTAL
	Percent											
1968-69	0.18	0.33	0.42	0.52	0.48	0.59	0.88	1.37	--	1.14	1.60	0.69
1969-70	0.43	0.52	0.43	0.55	0.36	0.80	0.69	1.66	--	1.67	2.45	0.84
1970-71	0.00	1.34	0.82	0.64	0.56	0.99	0.84	1.27	--	1.85	2.61	1.03
1971-72	0.29	1.20	0.98	0.77	0.54	0.81	0.46	1.58	--	1.27	1.36	0.84
1972-73	0.47	0.37	0.66	0.48	0.64	0.63	0.39	1.52				0.83
1973-74	--	0.79	0.99	0.75	0.79	0.99	0.98	1.74	1.53	--	--	1.03

Source: Department of the Treasury, Internal Revenue Service, Source Book of Statistics of Income, Annual, Active Corporations with and without Returns.

C. Industry Profitability

The Leather Tanning Industry in the United States experienced some rather difficult times during the early 1970's, particularly in 1972 and 1973. This was the result of the rapid rise in the price of hides and the tremendous increase in cattlehide exports. Between 1970 and 1973, 31 tanneries discontinued operations and total movement of cattlehides to tanners dropped from 19.2 million hides in 1972 to 17.7 million in 1973.

Since 1973, the industry performance has been considerably brighter. Demand for leather has been up and the long run picture appears to be strong. Industry production has increased in both 1975 and 1976, with production in 1976 being the highest since 1972. Because of higher production and favorable leather prices, sales were at an all-time high in 1976 and profits were acceptable. The outlook for 1977 is also favorable but industry authorities are very cautious.

Net Profits on Sales

Net profits, before taxes, expressed as percentages of sales, are depicted in Table 11 for the years between 1970 and 1975. As can be seen in the table prior to 1974, the industry's profits were relatively stable but yet quite low. As was explained above, 1973 was considered a particularly bad year for the industry and accordingly profits that year represent the poorest earned during the six year period. The recent increased demand for leather products as well as the improvements in the industry's raw hide supply are significant factors in the industry's improved profitability during 1974 and 1975.

When the Leather Industry's profitability is viewed for various sized operations it becomes apparent the medium and large tanneries tend to be more profitable than the smaller operations (Table 12). This may reflect some economics of scale, however it should be noticed that the profits of the largest size category in Table 12 are consistantly less than the next smaller size category. Thus, while economies of scale may be important, other factors such as effective management may have more influence.

Return on Investment

Consistent information regarding the industry's return on investment is difficult to obtain. However as reported in Robert Morris, Statement Studies, the industry's return appears to have been between 10 and 15 percent during the 1972 to 1974 time period. In 1975, the industry's return was determined to be 17.9 percent.

Table 11. The Leather Tanning Industry Profitability, 1970-1975.

Year	Profits Before Tax as Percent of Sales	Percent Profits Before Tax to Worth	Cash Flow as Percent Sales
	(%)	(%)	(%)
1970	2.2	N.A.	4.7
1971	2.4	N.A.	4.0
1972	2.5	10.0	4.4
1973	1.9	14.1	2.9
1974	6.0	12.7	N.A.
1975 DPRA Survey	6.7	17.9	N.A.
Rober Morris	6.5	20.0	N.A.
1976	4.5	15.5	5.7

Source: 1970 & 1971, Department of the Treasury, Internal Revenue Service, Source Book of Statistics of Income, Annual

1972 to 1976 Robert Morris Associates, Statement Studies, Annual

1975, Information from a data collection portfolio sent to the industry by DPRA

Table 12. The Leather Industry, Net Profits before Tax by Asset Size, FY 1969-1973.

	ASSET SIZE ($000)											
FISCAL YEAR	ZERO ASSETS	OVER ZERO UNDER 100	100 UNDER 250	250 UNDER 500	500 UNDER 1,000	1,000 UNDER 5,000	5,000 UNDER 10,000	10,000 UNDER 25,000	25,000 UNDER 50,000	50,000 Under 100,000	100,000 UNDER 250,000	INDUSTRY TOTAL
	Percent of Net Sales											
1968-1969	11.7	-2.2	1.7	2.1	4.0	5.0	7.5	6.2	---	7.7	3.8	4.1
1969-1970	4.0	-0.0	1.2	2.1	0.4	2.5	3.8	0.1	---	4.5	2.7	2.2
1970-1971	---	-6.5	-0.9	0.1	2.7	2.0	5.1	5.9	---	4.8	3.6	2.4
1971-1972	21.9	-4.6	2.5	-0.5	2.6	2.8	1.7	6.9	---	6.1	1.9	2.4
1972-1973	---	---	0.9	1.8	3.1	1.3	1.4	3.8	---	1.5	1.0	1.7
1973-1974	2.3	-9.5	1.6	-1.1	0.1	2.2	1.4	2.4	6.4	---	---	1.2

Source: Department of the Treasury, Internal Revenue Service, Source Book of Statistics of Income, Annual

Cash Flow

Cash flow represents the cash that is actually available for distribution, retention or use in acquiring additional assets. Utilizing data represented also in Table 12, it has been determined that cash flows as a percent of sales were relatively small during the period 1970 to 1973. While data are not available for 1974 and 1975, it is probable that the increased profits would result in substantially higher cash flows. A new Robert Morris Associates data series does show higher cash flows in 1976 as compared to early data.

D. Financial Structure of the Industry

Assets

Leather Tanning and Finishing can be considered a raw materials oriented industry as tanners must maintain relatively large quantities of hides and skins which represent a major component of the firms' capital requirements. As shown in Table 13, current assets have represented between 61 and 75 percent of the industry's total assets between 1969 and 1975. This reflects the large capital requirement tanners incur to maintain adequate supplies of raw hides and skins as well as the capital represented by in-process leather.

Contract tanners and finishers are the major exception to the above general statement as they do not buy hides to process and only perform a service for hide owners. In their operations, tanning and finishing materials and equipment would generate most of the capital requirements.

Fixed assets of the industry represent the conventional elements in every manufacturing or processing industry, i.e., the plant, land and equipment. In terms of the total assets, fixed asset requirements are relatively small. This does not imply that the industry requires relatively few fixed assets. Instead it reflects the significant amount of capital required for hides as well as the fact that most tanneries are older facilities and accordingly the costs of the fixed assets are significantly less than if they were recently acquired.

The distribution of assets does vary between the various sizes of tanneries. As shown in Table 14, the smaller tanneries reflect a lower proportion of the total assets as fixed assets than do the larger tanneries. This may be explained by the fact that the larger facilities are often newer, or at least more modern, which represents capital expenditures proportionately higher than those incurred by the older, smaller facilities.

Liabilities

Liabilities of the Leather Tanning Industry have been classified into two basic categories: (1) current, or short term liabilities, and (2) long

Table 13. The Leather Industry Assets, Liabilities and Equity, Selected Years

	1969	1970	1971	1972	1973	1974	1975	1976	Industry response 1975
	----------	----------	----------	----------	--percent--	----------	----------	----------	----------
Assets									
Current Assets	70	66	61	70	69	75	69	67	65
Fixed Assets	30	34	39	30	31	25	31	33	35
Total Assets	100	100	100	100	100	100	100	100	100
Liabilities and Equity									
Long Term Debt	19	17	15	13	16	17	18	19	11
Current Liabilities	28	32	27	29	35	33	28	35	28
Net Worth	53	51	58	58	49	50	54	46	61
Total Liabilities & Equity	100	100	100	100	100	100	100	100	100

Source: 1968-1972, Department of the Treasury, Internal Revenue Service, Source Book of Statistics of Income, Annual.

1973-1976, Robert Morris Associates, Statement Studies-Annual, 1974-1977.

Response to industry data collection portfolio, 1975, Development Planning and Research Associates, portfolio sent to industry in 1976.

Table 14. The Leather Industry, Assets, Liabilities and Equity, by Asset Size, 1972

	Asset Size ($000)										
	Under 100	100-249	250-499	500-999	1,000-4,999	5,000-9,999	10,000-24,999	25,000-49,999	50,000-99,999	100,000-249,999	Industr Total
	Percent										
Assets											
Current Assets	78	73	76	73	69	71	81	-	52	66	70
Fixed Assets	22	27	24	27	31	29	19	-	48	34	30
Total Assets	100	100	100	100	100	100	100	-	100	100	100
Liability and Equity											
Long Term Debt	22	21	11	9	7	4	28	-	17	21	13
Current Liabilities	67	45	36	30	38	26	17	-	13	15	29
Net Worth	11	34	53	61	55	70	55	-	70	64	58
Total Liability & Equity	100	100	100	100	100	100	100	-	100	100	100

Source: Department of the Treasury, Internal Revenue Service, Source Book of Statistics of Income, 1971-72.

term debt. The industry has maintained a much higher portion (approximately two-thirds) of its total liabilities in the form of short term liabilities as can be seen in Table 13. These short term liabilities typically represent accounts payable, unpaid wages, and minor plant and equipment maintenance and replacement expenses. When expressed as a percent of the total assets, current liabilities represent approximately 30 percent (Table 13).

Long term debt within the Leather Industry represents approximately 20 percent of the industry's total assets and 40 percent of the industry's total liabilities. The somewhat low proportion of long term debt reflects the relative age of the industry as most of the facilities and equipment were purchased many years ago and thus have been paid for or at least represent a lower purchase price than obtainable today.

Most of the industry's long term debt represents the debts of a few newer tanneries as well as debts incurred by older tanneries modernizing or expanding.

When the industry's liability structure is viewed with respect to size (Table 14) it becomes apparent the larger tanneries have a much more sizeable long term debt proportion of total liabilities than the smaller tanneries. Furthermore, the larger tanneries maintain a relatively low overall liability commitment (33 percent of total assets) than do the smaller tanneries (67 percent of total assets).

Net Worth

The net worth of the industry is defined as its total assets less its total liabilities. Thus the net worth represents what portion of the industry's assets are owned by the industry. Since 1969, the net worth, expressed as a percent of total assets, has varied. However, it has usually remained near the 50 to 60 percent range. These percentages would result in a debt to equity ratio of 0.8 to 1.0.

Net worth, when viewed with regards to tannery size, appears to be larger, when expressed in terms of total assets, for the larger sized tanneries than for the smaller tanneries (Table 14). This would imply that the larger tanners are less dependent on creditors for providing funds either for normal operations or capital improvements.

E. Cost of Capital - After Tax

Return on invested capital is a fundamental notion in U.S. business. It provides both a measure of actual performance of a firm as well as expected performance. In this latter case, it is also called the cost of capital. The cost of capital is defined as the weighted average of the cost of each type of capital employed by the firm, in general terms equities and interest bearing liabilities. There is no methodology that yields the precise cost of capital, but it can be approximated within reasonable bounds.

The cost of capital was determined for purposes of this analysis by estimating performance measures of the industry. The weights of the two respective types of capital for the Leather Tanning Industry were estimated at 39 percent debt and 61 percent equity. The cost of equity was determined from the ratio of earnings to net worth and estimated to be 12.3 percent.

To determine the weighted average cost of capital, it is necessary to adjust the before tax costs to after-tax costs (debt capital only in this case). This is accomplished by multiplying the costs by one minus the tax rate (assumed to be 48 percent). These computations are shown below and result in the estimated after-tax cost of capital being 9.2 percent.

Item	Weight	Before Tax Cost	Tax Rate	After Tax Cost	Weighted Cost
Debt	.39	9.0	.48	4.7	1.8
Equity	.61	--	--	12.3	7.5
					9.3

F. Assessment of Ability to Finance New Investment

The ability of a firm to finance new investment for hazardous waste management or plant expansion is a function of several critical financial and economic factors. In general terms, new capital must come from one or more of the following sources: (1) funds borrowed from outside sources; (2) equity capital through the sale of common or preferred stock; (3) internally generated funds--retained earnings and the stream of funds attributed to depreciation of fixed assets.

For each of the three major sources of new investment, the most critical set of factors is the financial condition of the individual firm. For debt financing, the firm's credit rating, earnings record over a period of years, stability of earnings, existing debt-equity ratio and the lenders' confidence in management will be major considerations. New equity funds through the sale of securities will depend upon the firm's future earnings as anticipated by investors, which in turn will reflect past earnings records. The firm's record, compared to others in its own industry and to firms in other similar industries, will be a major determinant of the ease with which new equity capital can be acquired. In the comparisons, the investor will probably look at the trend of earnings for the past five or so years.

Internally generated funds depend upon the margin of profitability and the cash flow from operations. Also, in publicly held corporations, stockholders must be willing to forego dividends in order to make earnings available for reinvestment.

The condition of the firm's industry and general economic conditions are also major considerations in attracting new capital. The industry will be compared to other similar industries in terms of net profits on sales and on net worth, supply-demand relationships, trends in production and consumption, the state of technology, impact of government regulations, foreign trade and other significant variables. Declining or depressed industries are not good prospects for attracting new capital. At the same time, the overall condition of the domestic and international economy can influence capital markets. A firm is more likely to attract new capital during a boom period than during a recession. On the other hand, the cost of new capital will usually be higher during an expansionary period. Furthermore, the money markets play a determining role in new financing.

Although, these general guidelines are very important to the Leather Tanning and Finishing Industry for assessing overall ability to finance new investment options, they will not need to be reviewed extensively regarding hazardous waste management. The capital requirements for waste management will be minimal and ability of a company to maintain profitability will be the key test in determining if the industry can adopt hazardous waste management measures.

Table 15. The Leather Industry, Financial Situation

	Robert Morris Associates[1/]					DPRA[2/]
	1972	1973	1974	1975	1976	1975
Pre-tax return on sales (%)	2.5	1.9	6.0	6.5	4.5	6.7
Pre-tax return on investment (%)	10.0	14.1	12.7	20.0	15.5	17.9
Debt to equity ratio	1.1	1.1	0.9	1.0	1.4	0.8
Current assets to current liabilities ratio	1.7	1.6	1.7	1.8	1.8	2.3

Sources: 1/ Robert Morris Associates, STATEMENT STUDIES - Annual

Year	No. of company statements
1972	32
1973	29
1974	31
1975	37
1976	35

2/ Development Planning and Research Associates, Industry Survey results from 135 companies for year of 1975.

V. PRICES AND PRICE DETERMINATION

The domestic price of leather is basically a function of the cost of raw materials (hides), the demand in the U.S. consumer market and competition among domestic and foreign leather tanners in the market. Cost of raw hides is determined by foreign and domestic competition for an inelastic hide supply. Demand for raw hides has virtually no influence on the supply of hides for the U.S. tanning industry, as the hide supply is a function of supply-demand factors affecting the cattle industry. For the U.S. tanners, their supply is primarily determined by the price they are willing to pay. Unquestionably, foreign hide demand has had an increasingly significant impact on the price U.S. tanners not only are willing to pay but also have to pay to procure hides from which their commodity is produced and priced.

Domestically, shoes have been the major leather good relative to demand for leather but the shoe industry has recently experienced strong competition from foreign producers. This has definitely hurt the leather industry causing declines in production, shifts to other leather good markets and development of new markets.

In the following sections, characteristics of recent price and price determination factors (supply and demand) will be analyzed more extensively. The initial subject will include a qualitative and quantitative analysis of the supply, demand and prices of leather. Then an evaluation of leather product imports and trade restrictions affecting leather will be presented, followed by an analysis of the raw hide market and discussion of international trade and trade restrictions on raw hides.

A. Leather Prices, Demand, and Supply

Prices of leather and the demand and supply situation experienced by U.S. leather tanners in recent years have been highly variable. Both bullish and bearish markets have existed, however, until the last couple years, a bear market was the more dominant. Although the last two or three years have been favorable for the industry, most industry analysts are skeptical or cautious due mainly to strong competition from foreign competition.

Leather Prices

The price of leather was at a record high in 1976. The wholesale price averaged over $1.00 per square foot, up about 40 percent from the previous year. The price strength originated from the strong demand for leather goods in 1976. The U.S. shoe industry increased production 7½ percent over the year, leather garment sales increased and most other leather goods sectors experienced higher sales.

Associated with the increased leather prices were higher hide prices. For example, heavy native steer hides average $.33 per pound or about $.58 per square foot on a tanned leather basis. This is the second highest current dollar price in recent years. See Table 16.

Table 16. Leather, price per square foot, 1955 to 1976 1/

Year	Current Dollars			Real Dollars 4/			Hide to Finished Leather Spread as a Percent of Finished Leather Price
	Hide Price 2/	Finished Leather Wholesale Price 3/	Hide to Finished Leather Spread	Hide Price	Finished Leather Wholesale Price	Hide to Finished Leather Spread	
	------------¢/sq. ft.------------			----------¢/sq. ft.-----------			-------Percent--------
1955	21.7	44.4	22.7	35.6	72.8	37.2	51.1
1956	21.7	49.9	28.2	34.5	79.3	44.8	56.5
1957	19.2	48.6	29.4	29.5	74.8	45.3	60.5
1958	20.0	50.6	30.6	30.3	76.5	46.2	60.4
1959	33.6	62.5	28.9	49.8	92.6	42.8	46.2
1960	24.0	55.5	31.5	34.9	80.8	45.9	58.0
1961	26.1	58.9	32.8	37.7	85.0	47.3	55.7
1962	26.6	61.9	35.3	37.7	87.7	50.0	57.0
1963	19.6	57.7	38.1	27.4	80.6	53.2	66.0
1964	18.0	58.1	40.1	24.8	79.9	55.1	69.1
1965	24.3	59.3	35.0	32.7	79.8	47.1	59.1
1966	30.4	64.4	34.0	39.6	83.9	44.3	52.8
1967	20.5	59.8	39.3	26.0	75.7	49.7	65.7
1968	20.6	61.1	40.5	24.9	74.0	49.1	66.2
1969	25.2	66.1	35.9	29.1	76.2	47.1	68.8
1970	22.4	64.1	41.7	24.5	70.1	45.6	65.0
1971	25.4	63.9	38.5	26.5	66.6	40.1	60.3
1972	52.1	80.4	28.3	52.1	80.4	28.3	35.2
1973	59.0	88.6	29.6	55.8	83.7	27.9	33.4
1974	45.3	82.8	37.5	38.9	71.1	32.2	45.3
1975	41.1	79.9	38.8	32.3	62.8	30.5	48.5
1976	57.8	110.9	53.1	43.2	82.9	39.7	47.9

1/ Sources: Hide prices - USDA, Livestock and Meat Statistics
Leather prices - Department of Labor, Bureau of Labor Statistics, Wholesale Price Index.

2/ Heavy Native Steer Hides converted to raw hide equivalent of one square foot tanned leather (1.75 pounds raw hide yields 1.0 square foot of tanned leather).

3/ Upper leather, cattle and kid sides, smooth.

4/ Prices adjusted by the GNP Implicit Price Deflator, Total GNP, 1972 = 100.

Historically, there has been a stable relationship between the price of leather and the price of hides. The relationship was essentially absolute and was reflected by stable margins between the raw material and finished product prices. The margin stability was especially true for the period from the late 1950's to 1971. After 1971, market disruptions made it difficult to maintain historical margins and classical relationships had to be adjusted in order to retain sales although the margin adjustment usually resulted in a loss.

The data in Table 16 include the current and real dollar values for leather (wholesale), cattlehides (pound-price converted to equivalent of one square foot of leather), and the equivalent square foot price spread or margin. The hide to finished price spread is graphed in Figure 4 which more clearly depicts the recent price spreads. Over time the current dollar price spread has been increasing at about the rate of .64 1/ cents per square foot per year. Based on the 1955-76 average price spread ($\bar{x}$) of 35 cents per square foot, the average annual change or increase has been about 1.8 percent per year. The increase is necessary to offset ever increasing production costs which consume much of the price spread.

Based on a real dollars analysis, the price spread on a trend basis has been declining at about .59 2/ cents per square foot per year. This equates to average annual decrease of 1.4 percent per year with the 22 year average real dollar margin ($\bar{x}$) of 43.2 cents per square foot. Thus, although the margin has been increasing in current dollars, the increase has not kept pace with the value of the dollar and the margin has declined in real terms.

Increased competition and declining volume has kept the industry operators from increasing production margins sufficiently to cover costs, and maintain historical profit levels. The industry has responded two ways: first, plants are continually attempting and often succeeding to increase production efficiency, second, inefficient plants unable to cover increasing costs with the small increase in market margins are eventually forced out of business. The existence of the latter situation is statistically portrayed by industry plant data.

1/ .64 cents per square foot per year is the coefficient of the trend line equation: 7=27.8 + .64 t where Y_i=margin in year$_i$, and t=year$_i$, i-1, 2, ...,22 starting with 1955.

2/ .59 cents per square foot per year is the coefficient of the trend line equation: y=49.9 - .59t
Where: y = real dollar margin in year$_i$
t = year$_i$, i=1, 2, ...,22 starting with 1955.

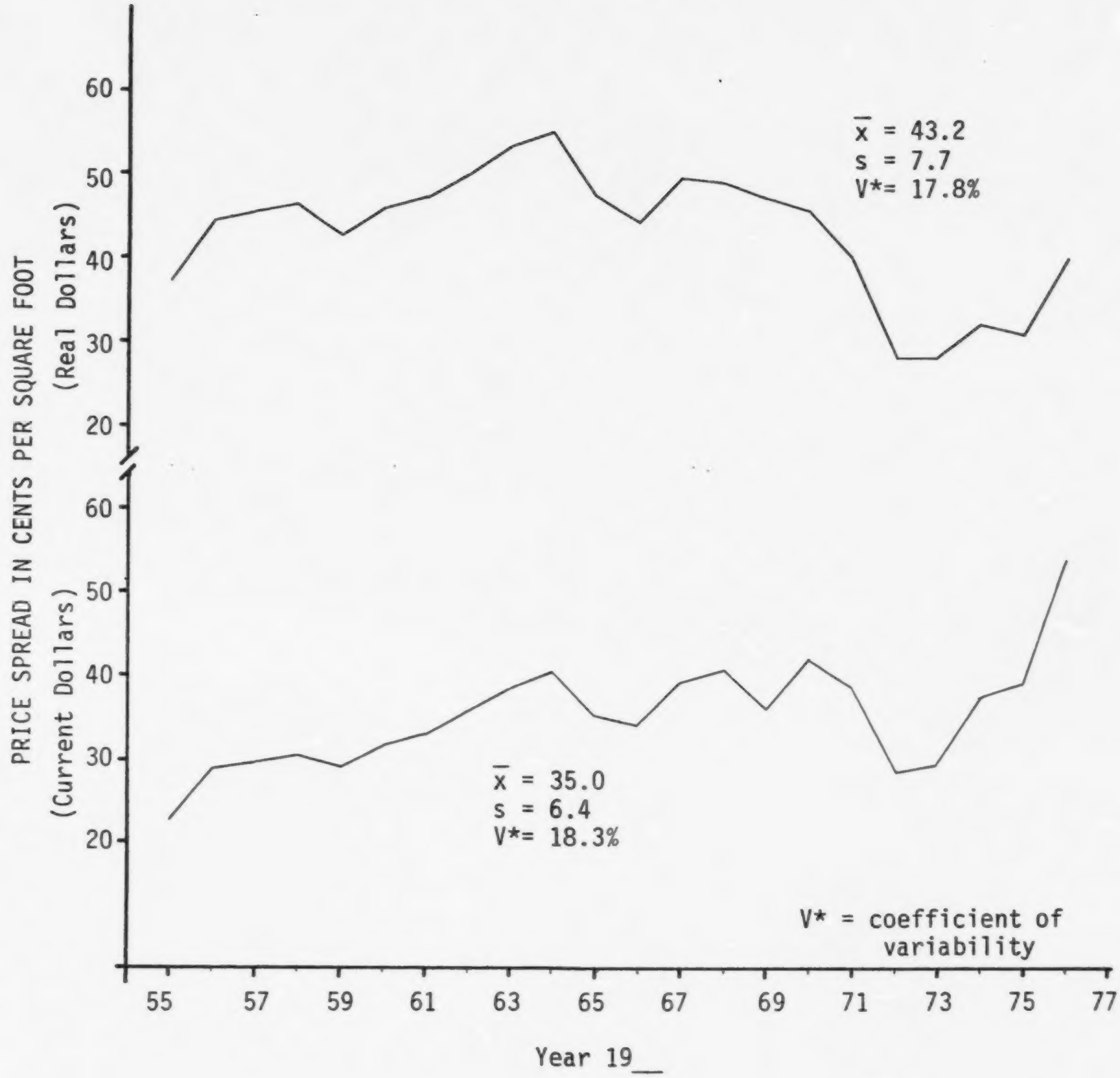


Figure 4. The tanned leather equivalent price spread between the price of cattlehides and wholesale price of leather, cents per square foot, current and real dollars, 1955-1976.

Demand for Leather

The demand for leather is a derived demand resulting from consumer interest in leather products. However, to get a true perspective of the demand for U.S. tanned leather, several other factors must be taken into consideration in addition to the international demand for leather.

First the domestic shoe industry, the primary customer for U.S. tanned leather has slowly but steadily been losing its share of the domestic market to international competition. In 1965 only 12.3 percent of the shoes purchased in the U.S. were manufactured overseas, however, by 1976 this had increased to 47.6 percent. Indications are that this trend will continue over the foreseeable future. During this time total U.S. demand for shoes fluctuated only slightly but in recent years since the advent of high inflation the trend has been down. Per capital consumption reached a peak in 1968 with 4.07 pairs but since that time has dropped to 3.43 pairs in 1975, but recovering significantly in 1976 to 3.94 pairs.

The resulting effect of the stable U.S. demand and increasing imports is the total pairs of shoes manufactured in the U.S. has declined steadily from 600 million pairs in 1965 to the 1975 level of 433 million pairs, a decline of 31 percent over the 10 year period (Table 17). Production was up in 1976, 444 million pair, but this appeared to be only an aberration as 8 months production data suggest that U.S. shoe production will drop below 400 million pair in 1977.

A further decline in the demand for leather can be seen in Table 17 which shows the percent of U.S. manufactured shoes made with leather soles. This has been declining steadily over the past 30 years and by 1976 only 14.6 percent of the U.S. shoes were made with leather soles, down from 25 percent in 1965.

During the 60's the substitution of synthetics for leather in the shoe uppers made substantial inroads in the market. In 1960 only 25 percent of the U.S. shoes were made with synthetic uppers. By 1976 this percentage had increased to 48 percent.

In summary the demand for leather from U.S. tanners going into the manufacture of shoes has declined from 78 percent of the total leather produced in the U.S. in 1970 to only 56 percent in 1975 and 59 percent in 1976 (Table 18).

Two and three years ago, demand for leather going into leather garments was a bright spot, accounting for 190 million square feet of domestic leather or 14.4 percent of the 1975 domestic productions. Rapid increases in imports from Korea have cast a dim shadow over that market

Table 17. U.S. Production of Shoes 1965-1975, (1,000 Pair).

	Total U.S. Production	Percent of U.S. Production With Leather Soles	Imports		Total Shoes	Pairs per Capita
			Total	Percent of Total U.S. Consumption		
1965	626,229	24.6	87,632	12.3	713,861	3.67
1966	641,696	24.8	96,135	13.2	737,831	3.75
1967	599,964	21.7	129,137	17.7	729,101	3.66
1968	642,427	17.4	175,292	21.4	817,719	4.07
1969	576,961	14.8	202,040	25.9	779,001	3.83
1970	562,318	16.4	241,560	30.0	803,878	3.91
1971	535,777	16.0	268,569	33.4	804,346	3.89
1972	526,655	17.0	296,665	36.0	823,320	3.94
1973	490,033	14.0	315,514	39.2	805,547	3.83
1974	452,955	14.2	294,457	39.1	747,412	3.53
1975	413,439	13.3	319,430	42.4	732,919	3.43
1976	444,087	14.6	404,455	47.7	848,542	3.94

Source: Tanner's Council of America, "Membership Bulletin Leather Industry Statistics".

Table 18. Leather markets profile 1976-actual and 1977 projected.

Products	Total Market Supply	Domestic Production	Imports	Imports As % of Total Market	Leather Equivalent of Domestic Prod. Square ft.	Leather Equivalent of Domestic Prod. Percent
	(Millions)	(Millions)	(Millions)		(Millions)	
			1976 Actual			
Shoes (non rubber)	848	444	404	47.6	770	58.9
Leather Garments	11	3.4	7.6	70	140	10.7
Leather Work Gloves (million doz. prs.)	5.5	3.6	1.9	35	107	8.2
Leather Handbags	30.5	16.5	14.0	59	90	6.9
Small Leather Goods	68	60	8	12	60	4.6
Leather Belts	52	48	4	8	55	4.2
Miscellaneous (including luggage, upholstery, saddlery, lace, latigo, skirting, collar, mechanical)	N.A.	N.A.	N.A.	N.A.	85	6.5
TOTAL					1307	100.0
			1977 Projected			
Shoes (non rubber)	790	375	415	52	630	54
Leather Garments	9	3	6	67	130	11
Leather Work Gloves (million doz. prs.)	6	3.8	2.2	37	112	10
Leather Handbags	31	15	16	52	83	7
Small Leather Goods	78	69	9	12	70	6
Leather Belts	48	43	5	10	48	4
Miscellaneous (as above)	N.A.	N.A.	N.A.	N.A.	90	8
TOTAL					1163	100

Source: Tanner Council of America "Membership Bulletin Leather Industry Statistics".

- some imported at extremely low prices - and in 1976, utilization for leather garments declined to 140 million square feet in 1976, 11 percent of the domestic production. See Table 18.

Other areas where demand still appears strong include: leather work gloves, 8.2 percent of leather produced; leather handbags, 6.9 percent; leather belts, 4.2 percent; small leather goods, 4.6 percent; and miscellaneous, 6.5 percent. Unfortunately, these segments represent less than 30 percent of the leather utilization in the United States. See Table 18.

Supply of Leather

The tanning industry generally responds to the demand for leather, thus production of U.S. leather is not necessarily related to the supply of U.S. hides. Less than half of the hides produced in the U.S. are consumed by U.S. tanners for processing thus the U.S. tanners find themselves competing with foreign tanneries for the available supply of U.S. hides. On this basis, they will buy the necessary hides to fill their expected demand at a given price. Whereas the total supply of hides available for tanning has been increasing steadily in the U.S. the number of hides going to the domestic tanners has been declining.

Shown in Table 19, are industry's annual production data from 1955 to 1976. The industries output has steadily declined throughout this period, falling from 37.2 million equivalent hides in 1955 to a low of 20.0 million in 1974. On the average, production has declined 2 percent per year. At an output of 25 million equivalent hides, the 2 percent decline is equal to 500,000 hides or about 20 million square feet of leather. Such a decline is equal to the annual output of two medium sized chrome tanners.

B. Imports of Finished Leather Products into the United States

The United States is the world's largest importer of leather products with Germany, the United Kingdom and Switzerland following in that order. Importers know the United States is a big attractive market for foreign leather products and the market has been growing at a rapid rate. As a result, imports of leather goods into the U.S. have been growing at an accelerating rate. This has created what some industry experts perceive as a very serious threat to the domestic tanning and leather goods industries.

This trend has occurred in other developed countries. In Germany, Sweden and other countries, leather imports have reduced the leather tanning and leather products industries to a fraction of their former size. The exact reasons for this shift are many and complex. Basically, the leather industry is labor intensive and developing countries find they have certain advantages in competing on a cost basis (however, we have not been able to quantify these factors on any suitable basis). Second it is an industry that does not require a high level of technology such as the computer industry or aircraft industry and can be adapted to developing countries. Third, a complicated series of trade restrictions have been built up which prohibits

Table 19. Tanning industry production, cattlehide equivalents, 1955-1976

Year	1,000 cattlehide equivalents	% change from previous year
1955	37,220	--
1956	36,810	-1.1
1957	35,820	-2.7
1958	33,810	-5.6
1959	34,090	+0.8
1960	31,850	-6.6
1961	32,226	+1.2
1962	31,596	-2.0
1963	31,325	-0.9
1964	32,187	+2.8
1965	32,697	+1.6
1966	32,252	-1.4
1967	30,861	-4.3
1968	31,884	+3.3
1969	28,388	-10.9
1970	25,941	-8.6
1971	25,267	-2.6
1972	24,661	-2.4
1973	21,062	-14.6
1974	19,998	-5.0
1975	21,894	+9.5
1976	23,526	+7.5

average annual change from 1955 to 1976 equals -2.0%

the U.S. tanning and leather products industries from competing favorably in foreign markets. The second part of this section is devoted to looking at some of these aspects. Fourth, developing countries such as Korea, Taiwan, and Brazil see this industry as one in which they can compete on an international basis and earn a valuable source of badly needed foreign exchange. As a result they tend to "push" the industry in their countries.

Trends in Imported Leather Goods

Table 20 demonstrates the U.S. foreign trade in leather products. The value of imports have tripled from 1969 to 1976 increasing from $631 million to over $2.17 billion in 1976. Exports during this period increased rapidly but in 1976 amounted to only $111 million or only 5.1 percent of imports.

Footwear is the major product imported accounting for two-thirds of total imports in 1976. It makes up approximately the same proportion of total imports today as it did 5 years ago. Leather wearing apparel has made rapid increases since 1972 and is the second most important product line. Again in 1976, leather apparel imports made rapid increases. Handbags and luggage make up the next most important categories with imports of $185 million and $161 million respectively in 1976.

The following observations are obtained from viewing import statistics. Latin American countries have good access to the United States market; Mexico, Columbia and Brazil regularly export certain types of leather goods. Lebanon, Morocco, Yugoslavia and Hong Kong are the only developing countries outside Latin America which regularly export certain types of leather goods to the United States. Some developing countries have begun to emerge as suppliers in recent years. For example, Israel, the Republic of Korea and China (Taiwan) have become important exporters of leather products to the U.S.

Trade Restrictions

Foreign sources have free access to U.S. raw hides and skins. At the same time, U.S. tanners are denied equal access to foreign leather markets. This is one of the primary concerns of the U.S. leather tanning industry.

Representatives of the U.S. leather industry feel that current and past trade legislation and duties have not been effective in curtailing U.S. imports of leather and leather products. Therefore, they are not in favor of any further cuts in U.S. duties on competitive imports.

The following section is an overview of some of the tariffs and trade legislation which has and/or could affect the industry. The following discussion is largely taken from a report, Leather and Leather Products, which was published by the United Nations in 1971.

Table 20. United States Foreign Trade in Leather Products ($1,000)

	Imports						
Year	Footwear[1/]	Wearing apparel	Handbags & purses	Luggage & flat goods	Other products	Total imports	Total Exports
1969	435,884	19,674	58,420	38,393	78,643	631,014	33,984
1970	559,347	38,233	62,974	41,366	87,282	789,202	35,732
1971	678,352	59,251	67,606	49,758	74,188	929,155	36,987
1972	832,652	91,773	83,623	76,795	83,561	1,168,404	43,756
1973	976,106	109,728	108,211	100,231	94,380	1,388,656	55,037
1974	982,892	123,066	106,853	95,890	106,723	1,415,424	79,754
1975	1,135,348	154,334	124,776	89,486	81,963	1,585,907	88,852
1976	1,452,358	236,587	185,000	160,754	140,086	2,174,785	110,904

[1/] Other than rubber

Source: Tanners Council of America

Tariff Structures

Tariffs have a tendency to increase as the degree of processing or the manufacturing content of the article increases. The leather industry is an example of this. In all countries most raw hides and skins enter duty free. Leather tends to carry a tariff of about 5 to 10 percent, while leather footwear and other finished articles tend to carry tariffs of between 10 and 25 percent. Japan and Finland are exceptions to this tendency of tariffs to escalate as manufacturing content increases. Japan has elaborate sets of restrictions on leather and leather goods imports. It is the only country which imposes restrictions on imports of leather itself.

Effective Rates of Tariffs

A tariff imposed on the principal product of some industry affords that industry increased protection. In order to measure the effective degree of protection consideration must be given to all of the relevant tariffs and not merely those on the principal product or products of the industry.

An Effective Tariff Rate is defined as the percentage increase in value added per unit of output in a given industry which is made possible by the tariff structure. The effective tariff rate is a measure of the excess remuneration of domestic factors of production, obtainable because of the tariffs, as a percentage of what value added would be in a free-trade situation.

A tariff on the outputs of an industry and none of the inputs results in the effective tariff rate being higher than the nominal rate (price) (see Table 21). In the Leather Industry, since the tariff rate escalates with increasing levels of production, the effective rate of protection is even greater than the nominal tariff applied to leather. The effective rate of protection for footwear or other leather product industries tends to be greater than the nominal tariffs on leather products.

The effective rate of protection is dependent on three factors: (1) the cost structure of the industry; (2) the nominal tariff on output; and (3) the difference between this rate and tariffs on inputs. Owing to the sensitivity of effective rates to differences between tariffs on outputs and tariffs on inputs, it does not follow that because the level of nominal tariffs is escalating effective rates must be escalating. On the contrary, the effective rates of protection may easily be just as high at the earlier stages of production as at the later stages of production. This is particularly true if value added is relatively small at the earlier stages.

Effect of Current Legislation

Current and past trade legislation and duties have not been effective in curtailing U.S. imports of leather and leather products. Therefore, many industry leaders are lobbying for more effective tariff rates and they are definitely not in favor of any further cuts in U.S. duties on competitive imports.

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Table 21. Effective Rates of Protection for Leather and Footwear Industries. (Illustrative calculation using United States data, post-Kennedy Round tariff rates)

Leather Tanning Industry			Leather Footwear Industry		
Input Structure	Without Tariffs (hypothetical)	With Tariffs (actual)	Input Structure	Without Tariffs (hypothetical)	With Tariffs (actual)
Hides and skins	37	37	Leather	18.9	20
Other inputs	29.5	31	Other inputs	30.8	33
Value added	27.8	32	Value added	37.3	47
TOTAL	94.3	100	TOTAL	87.0	100

Tariff Rates Used

Leather Tanning Industry (percent)		Leather Footwear Industry (percent)	
Hides and skins	0	Leather	6
Other inputs (chemicals, detergents, etc.)	5	Other inputs (rubber, plastics, etc.)	7
Leather	6	Leather footwear	13

Effective rate on tanning: $\frac{32-27.8}{27.8} = 15$ percent

Effective rate on leather footwear: $\frac{47-37.3}{37.3} = 26$ percent

Source: Leather and Leather Products, United Nations, 1971.

A number of trade associations, particularly the American Footwear Industries Association, have petitioned the U.S. International Trade Commission to conduct investigations concerning serious injury or threats of serious injury to the industry. The Commission's findings on the basis of its investigation was that "footwear is being imported in such increased quantities as to be a substantial cause of serious injury to the domestic industry or certain industries producing articles like or directly competitive with imported articles." The Commission has not made any decision pending the completion of its investigation.

In the past years there have been attempts to pass legislation which would enhance the international trade position of the industry. The Kennedy Round is one. With only one exception, the Kennedy Round decreased the effective rates of protection through modest reductions in tariffs. Hides and skins already entered free of duty so that no reductions were called for. Rates for pre-tanned leather were reduced very little. In the case of finished leather, the United States halved its rates.

The Generalized System of Preferences (GSP) is another trade legislation which was intended to establish a system of generalized preferences in favor of developing countries. The impact of the Generalized System of Preferences is to permit manufactured and semi-manufactured products by developing countries to enter duty-free. The overall objective is to encourage the industrialization of developing countries through increased export earnings.

The GSP did not have any noticeable affect on hides and skins exports because they were allowed to enter duty-free before this 1970 agreement. In the semi-manufactured group of products, many countries have exceptions in terms of the products covered by GSP. For example, the U.S. does not give preferential treatment to all types of footwear. The overall affect of the GSP is also reduced due to the fact that many countries set upper limits on the value of items that will be given preference. In general, the effect of the GSP has lessened in the case of leather and leather products because so many developed market economies have various exceptions and restrictions imposed on items which are covered by the agreement.

In 1975 the Trade Act recommends that the Administration arrange for international agreements which would establish procedures for the importation of certain articles, including footwear, into the United States. In addition, the 1974 Trade Act prohibits extending the Generalized System of Preferences.

C. The Raw Hide Market

Cattle hides are the primary raw material used in the leather tanning industry and are a by-product of the meat industry. For example, the value of a raw cattlehide traditionally represents only 3 to 6 percent of the value of the live animal. As a result, the supply of hides is highly inelastic, i.e. neither price nor demand for hides has substantial influence on the total hide supply.

Price and demand will alter the destination of the raw hide supply. Recently, more of the supplies have entered the world market and international trade has become an even greater concern relative to raw hide movement. For example, in 1976, for the first time, over half of the cattlehides were exported to foreign tanneries and their effect on domestic prices has been substantial. It is vital that one look at the broad international setting to understand the price of raw materials as well as leather and leather goods prices.

Supply of Hides

The supply of cattlehides in the U.S. has been steadily increasing over the past two decades as shown in Table 22. In 1955, 26 million cattle were slaughtered commercially in the U.S. including 19 million slaughtered as Federal Inspected Slaughter (F.I.S.), and an additional 7 million were slaughtered in other commercial establishments1/. This number remained constant to 1960 when again 25.2 million head were slaughtered. During the 60's the number grew rapidly as the cattle feeding industry developed and greatly increased the total U.S. capacity over the previously grass fattened production. By 1970 the number increased to 35.2 million where it stabilized for the next few years then slaughter increased to 40.9 and 42.6 million head in 1975 and 1976 respectively as the large buildup of cattle numbers was reduced. Since 1960, the rate of cattle slaughter increased in the U.S. at approximately 1 million head per year. Approximately 50 percent of all cattle slaughtered were classified as heavy steers. Only 2.0 percent were bulls and stags, with the remaining 48 percent classified as cows and heifers.

Total cattle numbers in the U.S. are estimated at 122.9 million head. Based on this number the U.S. experienced a hide take-off rate of 35 percent in 1976 (a recent low was hit in 1973 with a take-off rate of 27.7 percent).

The livestock industry is firmly established in the U.S. and in spite of recognized ups and downs is committed to long term growth assuring the tanning industry an increasing supply of cattlehides in the future.

Suppliers of other types of leather making raw material do not show the same trend as cattlehides. Prior to 1974, calfskin supplies had been shrinking drastically in the U.S. and, although making recent gains, are not expected to be a dominant factor in the market in the future. Calfskin production in 1976 was estimated at 4.5 million skins which represented a 40 percent rise above 1974 production of about 3.2 million skins. Sheep and lamb skins, the only other major source of hides and skins in the U.S., have been declining steadily in the U.S. over the past two decades. Although the numbers are responsive to price developments in meat and wool, the long

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1/ Federal Inspected Slaughter means that the animal is slaughtered and processed in a slaughterhouse and inspected by federal meat inspectors. This allows the meat to be identified as such and in turn allows the meat to be sold interstate.

Table 22. Annual cattle slaughter in the United States, 1955-1975, (1,000 head)

	Breakdown of federally inspected slaughter							
	Cows & heifers	% Total	Steers	% Total	Bulls & stags	% Total	Total F.I.S.	Total commercial slaughter
1955	9,330	48.9	9,299	48.8	427	2.3	19,056	25,723
1956	9,460	46.9	10,311	51.1	415	2.0	20,186	26,862
1957	9,031	46.4	10,018	51.5	404	2.1	19,453	26,232
1958	7,509	42.6	9,840	55.8	293	1.6	17,642	23,555
1959	7,538	43.2	9,681	55.4	241	1.4	17,460	22,931
1960	8,567	44.2	10,557	54.4	272	1.4	19,396	25,224
1961	8,554	42.8	11,164	55.9	250	1.3	19,968	25,635
1962	8,670	42.6	11,447	56.3	222	1.1	20,339	26,083
1963	8,964	41.4	12,496	57.7	202	0.9	21,662	27,231
1964	10,452	41.6	14,395	57.3	286	1.1	25,133	30,818
1965	12,712	47.8	13,488	50.7	413	1.5	26,613	32,347
1966	13,055	47.8	13,846	50.7	418	1.5	27,319	33,725
1967	12,710	45.8	14,676	52.8	384	1.4	27,780	33.869
1968	13,771	46.5	15,361	51.9	460	1.6	29,592	35,026
1969	14,284	46.8	15,754	51.6	499	1.6	30,537	35,237
1970	13,677	44.4	16,608	53.9	508	1.7	30,793	35,025
1971	13,856	44.1	17,003	54.1	560	1.8	31,419	35,585
1972	13,932	43.2	17,737	55.0	581	1.8	32,250	35,774
1973	13,293	43.6	16,591	54.0	611	2.0	30,521	33,687
1974	14,755	44.3	17,824	53.5	740	2.2	33,319	36,811
1975	19,838	53.8	16,071	43.5	995	2.7	36,904	40,900
1976	20,815	53.4	17,270	44.3	907	2.3	38,992	42,644

Source: Tanners Council of America, Inc.

term prospect of sheepskins from domestic sources is declining. Sheepskin production, which was estimated at 11.5 million in 1976 dropped approximately 2 percent from the 1975 level of 11.7 million skins.

Total movement of cattlehides to U.S. tanners has been decreasing over the past 10 years as U.S. tanners and the U.S. shoe industry have been confronted with stiff international competition and restrictive trade legislation. Total wettings of domestic tanneries decreased from 23.5 million hides or 66.8 percent of the U.S. total cattlehide production in 1966 to 17.5 million hides or 46.5 percent in 1974. Total wetting increased in 1975 and 1976 to 19.1 million and 20.4 million respectively. These levels represented 46 and 47 percent of the total U.S. cattlehide production in those two years. See Table 23.

World Supply of Hides and Skins

Cattle numbers in the U.S. and throughout the world were on an upward trend prior to 1976, after which time drought in many countries and unfavorable prices in key countries have caused cattleherd reductions. The Foreign Agriculture Service of the USDA estimated cattle numbers in 1974 at 707 million with an estimated increase to 724 million in 1975 or approximately a 2 percent increase. Production for 1976 was down, however, by about 2 million head and is expected to decline further in 1977, dropping to 715 million head. This is still well above historic levels as the average 1968-1972 production was 635 million head per year. See Table 24.

For countries that data are reported, the U.S. is the largest producer accounting for about 18 percent of the world production. The USSR is second with about 15 percent. Other countries have more cattle, specifically India, but as they are not slaughtered in the countries, no major hide production occurs as hides are only removed from some fallen animals.

A more meaningful number is the total hides produced by country shown in Table 25. As estimated by the Foreign Agriculture Service, total hide production in the 1966-1970 period averaged 176 million hides per year. This decreased slightly over the next few years as slaughter rates declined but increased sharply in 1974 and 1975 to 182.7 and 198.5 million hides respectively.

The U.S. is clearly the leader in hide production with a reported 49.9 million estimated take off in 1975. As this estimate by the FAS includes an estimate for death losses, we would argue that this number is probably overstated by 6-8 million hides. This is due to the fact that hides from animals which die in the field are often not useable for tanning. When such an adjustment is made, the FAS estimate of hide production is in line with the estimate prepared by the Tanners' Council (Table 22). The USSR is next in importance with 37.0 million hides. Argentina and Brazil produced an estimated 13.2 and 11.3 million hides in 1975. It is interesting to note that although Brazil has an estimated 91 million head of cattle compared to Argentina's 58 million, Argentina produces a higher number of hides. This is due to the low quality and poor slaughter rate in many Brazilian herds.

Table 23. Movement into sites of cattlehides, expressed in number (1,000 hides) and as a percent of total estimated slaughter 1/

Year	Estimated total slaughter	Exports and Re-Exports		Imports		Net Export		Total Movement to Tanners	
		number	percent	number	percent	number	percent	number	percent
1966	35,260	14,205	40.3	221	0.6	13,984	39.6	23,572	66.8
1967	35,381	11,866	33.5	232	0.6	11,634	32.9	23,607	66.7
1968	36,076	12,853	35.6	494	1.4	12,359	34.2	23,617	65.5
1969	36,118	14,790	40.9	277	0.7	14,513	40.2	21,096	58.4
1970	35,740	15,229	42.6	385	1.1	14,844	41.5	20,199	56.5
1971	36,280	15,969	44.0	275	0.7	15,694	43.2	20,189	55.6
1972	36,480	17,584	48.2	292	0.8	17,292	47.4	19,218	52.7
1973	34,700	16,871	48.6	694	2.0	16,177	46.6	17,733	51.1
1974	37,700	18,444	48.9	520	1.4	17,924	47.5	17,536	46.5
1975	41,800	21,287	50.9	958	2.3	20,329	48.6	19,067	45.6
1976	43,582	25,280	58.0	962	2.2	24,318	55.8	20,397	46.8

1/ It should be noted net exports plus total movements to Tanners do not necessarily equal total estimated slaughter. This is accounted for by the fact that not all slaughtered animals produce useable hides as well as the fact that some hides may move to tanners before they are exported.

Source: Tanner Council of America "Membership Bulletin Leather Industry Statistics", 1976.

Table 24.

CATTLE AND BUFFALO: NUMBERS IN SPECIFIED COUNTRIES - AVERAGE 1968-72, ANNUAL 1973-77
IN UNITS OF 1,000 HEAD

REGION AND COUNTRY	AVERAGE 1968-72	1973	1974	1975	1976	1977 1/
NORTH AMERICA:						
CANADA	11,791	12,726	13,210	14,008	13,096	13,185
COSTA RICA	1,501	1,694	1,742	1,816	1,894	1,910
DOMINICAN REPUBLIC	1,207	1,500	1,837	1,900	1,950	2,100
EL SALVADOR	1,294 2/	1,008	1,038	1,074	1,100	1,162
GUATEMALA	1,503	1,808	1,916	2,031	2,148	2,270
HONDURAS	1,561	1,641	1,661	1,689	1,750	1,800
MEXICO	24,844	26,830	27,512	28,700	29,200	28,600
NICARAGUA	1,976	2,295	2,400	2,500	2,600	2,720
PANAMA	1,199	1,312	1,333	1,348	1,361	1,375
UNITED STATES	112,839	121,534	127,670	131,826	127,976	122,896
TOTAL	159,714	172,348	180,319	186,892	183,675	178,078
SOUTH AMERICA:						
ARGENTINA	50,060 2/	54,771	58,250	59,550	59,050	58,350
BRAZIL	85,510 2/	86,135	92,000	94,000	95,000	96,000
CHILE	2,892	2,890	3,456	3,606	3,336	3,100
COLOMBIA	19,974	22,100	23,032	23,032	23,222	23,859
ECUADOR	2,208	2,400	2,465	2,593	2,725	2,864
PERU	4,018 2/	3,800	4,144	4,200	4,260	4,300
URUGUAY	8,757	9,860	10,961	11,362	10,701	10,750
VENEZUELA	8,434	8,843	9,088	9,404	9,592	9,784
TOTAL	181,846	190,799	203,396	207,747	207,886	209,007
EUROPE:						
WESTERN:						
EC:						
BELGIUM/LUXEMBOURG	2,862	2,954	3,104	3,103	3,011	3,016
DENMARK	2,897	2,810	3,100	3,060	3,060	3,080
FRANCE	21,680	22,556	23,949	24,327	23,841	23,510
GERMANY, FEDERAL REP. OF	13,998	13,892	14,364	14,430	14,493	14,520
IRELAND	5,253	5,945	6,408	6,500	5,966	6,060
ITALY	9,342	8,738	8,487	8,243	8,529	8,900
NETHERLANDS	3,803	4,117	4,723	4,719	4,606	4,523
UNITED KINGDOM	12,348	13,760	14,839	14,840	13,915	13,300
TOTAL EC	72,184	74,772	78,974	79,222	77,421	76,889
AUSTRIA	2,460	2,514	2,624	2,581	2,500	2,489
FINLAND	1,845	1,712	1,780	1,704	1,702	1,661
GREECE	1,048	1,065	1,234	1,251	1,308	1,350
NORWAY	963	947	963	947	901	900
PORTUGAL	1,114 2/	1,400	1,072	1,100	1,080	1,000
SPAIN	4,192	4,475	4,413	4,417	4,408	4,412
SWEDEN	1,938	1,886	1,909	1,879	1,876	1,870
SWITZERLAND	1,859	1,911	1,973	1,964	2,005	2,000
TOTAL	87,603	90,682	94,942	95,065	93,113	92,571
EASTERN:						
BULGARIA	1,397	1,512	1,521	1,622	1,725	1,790
CZECHOSLOVAKIA	4,309	4,466	4,556	4,566	4,555	4,654
GERMANY, DEMOCRATIC REP. OF	5,156	5,379	5,482	5,585	5,532	5,470
HUNGARY	1,957	1,893	1,931	2,018	1,904	1,888
POLAND	10,344	11,265	12,309	12,815	12,762	12,045
ROMANIA	5,249	5,767	5,897	5,983	6,126	6,349
YUGOSLAVIA	5,307	5,3[illegible]6	5,601	5,872	5,755	5,830
TOTAL	33,720	35,648	37,377	38,461	38,359	38,026
SOVIET UNION	97,945	104,006	106,266	109,122	111,034	110,300
AFRICA:						
SOUTH AFRICA	11,142	11,741	11,911	12,333	12,774	13,146
TOTAL	11,142	11,741	11,911	12,333	12,774	13,146
ASIA:						
CHINA, REP OF (TAIWAN)	307	248	235	242	249	249
IRAN	6,039	6,615	7,265	7,200	7,250	7,300
ISRAEL	239	260	280	300	323	320
JAPAN	3,478	3,569	3,650	3,644	3,723	3,875
KOREA, REP OF	1,253	1,374	1,545	1,858	1,442	1,601
PHILIPPINES	6,184	7,036	5,107	4,769	4,462	4,480
TURKEY	14,470	14,084	14,259	14,410	14,802	15,000
TOTAL	31,970	33,186	32,341	32,423	32,451	32,795
OCEANIA:						
AUSTRALIA	22,747	29,101	30,839	32,793	33,434	32,000
NEW ZEALAND	8,644	9,088	9,415	9,645	9,769	9,572
TOTAL	31,392	38,189	40,254	42,438	43,203	41,572
TOTAL SELECTED COUNTRIES	635,331	676,599	706,806	724,481	722,495	715,695

NOTES: VARIOUS DATES OF ENUMERATION ARE USED BY THE COUNTRIES REPORTING ANIMAL NUMBERS. THIS TABLE CLASSIFIES THESE DATA AS CLOSE TO JANUARY 1 AS POSSIBLE.

1/ PRELIMINARY.
2/ DATA INCLUDED IN THE AVERAGE FOR THESE COUNTRIES ARE NOT COMPARABLE TO SUBSEQUENT YEARS SHOWN BECAUSE OF A BREAK IN THE OFFICIAL SERIES.

FOREIGN AGRICULTURAL SERVICE. PREPARED OR ESTIMATED ON THE BASIS OF OFFICIAL STATISTICS OF FOREIGN GOVERNMENTS, OTHER FOREIGN SOURCE MATERIALS, REPORTS OF U.S. AGRICULTURAL ATTACHES AND FOREIGN SERVICE OFFICERS, RESULTS OF OFFICE RESEARCH, AND RELATED INFORMATION.

Table 25. Bovine Hides and Skins: Production in Specified Countries[1/], Average 1966-70, Annual 1971-75.

IN UNITS OF 1,000 PIECES

REGION AND COUNTRY	AVERAGE 1966-70	1971	1972	1973	1974	1975 2/
NORTH AMERICA:						
CANADA	4,316	4,003	4,037	3,904	4,245	4,045
COSTA RICA	241	298	308	308	335	336
DOMINICAN REPUBLIC	175	175	288	218	219	200
EL SALVADOR	148	143	166	150	187	175
GUATEMALA	316	301	378	349	350	390
HONDURAS	181	264	278	289	235	306
MEXICO	3,276	3,490	3,569	4,376	4,966	5,387
NICARAGUA	250	375	344	348	287	327
PANAMA	156	188	202	195	197	219
UNITED STATES 3/ 4/	41,682	41,058	39,943	38,961	42,777	48,971
TOTAL	50,697	50,367	49,411	49,081	53,740	62,255
SOUTH AMERICA:						
ARGENTINA 3/	13,628	10,444	11,056	10,932	11,163	13,196
BRAZIL	8,638	9,400	10,240	12,260	10,500	11,250
CHILE	637	564	407	324	671	750
COLOMBIA	2,244	2,888	2,671	2,307	2,474	2,536
ECUADOR	265	316	328	343	357	374
PERU	754	847	742	690	688	710
URUGUAY	1,231	1,109	1,252	1,128	1,573	1,750
VENEZUELA	1,091	1,272	1,256	1,320	1,369	1,420
TOTAL	28,500	26,934	27,952	29,356	28,717	31,995
EUROPE						
WESTERN:						
EC:						
BELGIUM-LUXEMBOURG	1,062	1,124	1,046	1,021	1,153	1,159
DENMARK	1,193	1,081	881	889	1,125	1,128
FRANCE	8,366	8,125	7,040	6,725	7,974	8,003
GERMANY, WEST	5,606	5,719	4,691	4,801	5,436	5,235
IRELAND	881	975	847	940	1,460	1,700
ITALY	3,979	4,104	3,703	4,923	4,977	4,327
NETHERLANDS	1,727	1,930	1,691	1,721	1,900	2,080
UNITED KINGDOM	3,993	3,953	3,829	3,425	4,604	4,226
TOTAL EC	26,797	27,010	23,728	24,445	28,636	27,852
AUSTRIA	825	759	722	713	837	844
FINLAND	865	828	775	804	780	725
GREECE 5/	518	513	495	471	544	553
NORWAY	457	381	386	355	404	394
PORTUGAL	377	400	359	396	395	448
SPAIN	1,425	1,715	1,474	1,633	1,898	1,759
SWEDEN	844	720	808	630	724	[illegible]
SWITZERLAND	791	812	747	747	814	[illegible]
TOTAL WESTERN	32,534	33,146	29,269	30,076	35,052	34,067
EASTERN:						
CZECHOSLOVAKIA	1,619	1,495	1,475	1,513	1,550	1,550
GERMANY, DEM. REP. OF	1,661	1,647	1,701	1,665	1,669	1,707
HUNGARY	475	434	390	403	423	450
POLAND	4,832	4,697	4,250	4,326	4,853	5,080
YUGOSLAVIA	1,976	1,954	1,717	1,886	2,155	2,253
TOTAL EASTERN	10,550	10,236	9,533	9,793	10,650	11,030
TOTAL EUROPE	43,490	43,382	38,802	39,867	45,702	45,097
U.S.S.R.	37,874	36,700	34,538	34,938	35,960	37,000
AFRICA:						
SOUTH AFRICA	2,484	2,632	2,925	2,901	2,353	2,355
TOTAL	2,484	2,632	2,925	2,901	2,353	2,355
ASIA:						
CHINA, REP. OF (TAIWAN)	47	45	27	34	30	8
IRAN 5/	569	614	669	675	685	700
JAPAN	961	1,251	1,235	818	1,310	1,277
KOREA, REP. OF	247	274	219	261	325	471
PHILIPPINES 5/	542	520	585	792	759	777
TURKEY	2,545	2,505	2,300	2,622	3,265	3,800
TOTAL	4,911	5,209	5,034	5,202	6,229	7,074
OCEANIA:						
AUSTRALIA	5,771	6,092	7,306	8,267	6,741	9,167
NEW ZEALAND	2,748	2,814	2,981	2,938	3,217	3,647
TOTAL	8,519	8,906	10,287	11,205	9,958	12,814
TOTAL SELECTED COUNTRIES	176,676	174,130	169,969	172,530	182,667	190,540

1/ ESTIMATED FROM CATTLE AND CALF SLAUGHTER.
2/ PRELIMINARY.
3/ INCLUDES AN ESTIMATE FOR [illegible].
4/ EXCLUDES ALASKA AND HAWAII [illegible].
5/ INCLUDES BUFFALOES.

Source: Foreign Agricultural Service. Prepared or estimated on the basis of official statistics of foreign governments, other foreign source materials, reports of U.S. Agricultural attaches and foreign service officiers, results of office research and related information. September 1976.

Australian hide production has fluctuated widely from a low of 5.8 million during the 1966-70 period to a high of 9.2 million in 1975. This is due to the volatile cattle market in Australia since they have a great dependence on the international beef market which also has fluctuated in recent years. A very high herd build up in 1973-1974 has resulted in sharp herd reductions and high slaughter rates in 1975.

The Demand for Raw Hides

The U.S. tanners must compete directly with foreign buyers for the supply of hides made available as a by-product of the livestock slaughter industry. In this section we will deal primarily with the international demand for hides. In earlier sections we looked at the demand placed on the U.S. tanners for leather and leather products which, in turn, translates directly into the U.S. demand for raw hides.

Exports of raw hides have increased steadily over the past two decades. The total international supply has been restricted by trade practices and accordingly the U.S. Leather Tanning Industry has been gradually losing its market share to foreign shoe and leather-goods manufacturers. In 1966, 40 percent of the cattlehides produced in the U.S. were exported and by 1976 net exports had increased to 56 percent. This amounted to a total of 24.3 million hides being exported in 1976. United States tanners purchased 1.0 million hides from foreign sources (primarily Canada and Mexico).

The rate at which the United States exports of raw hides has increased is shown in Table 26. Nearly one-third of U.S. hides are exported to the Japanese market with about 7.8 million hides exported in 1975. Mexico and Korea are next in importance with about 2.5 million hides each. It is significant to note the rapid increase in exports to Korea as they jumped from 411 thousand hides in 1972 to the 2.5 million reported for 1975. Other countries with rapid increases in U.S. hide purchases are Poland and Taiwan. The majority of the remainder of the increase in international demand for U.S. hides is reflected in the hides shipped to other countries which doubled from 1972 to 1975 with an estimated 1.2 million hides exported in 1975.

Argentina has traditionally been a large exporter of hides with an annual average of 8 to 8.5 million hides exported from 1966 to 1969. Argentine exports declined slightly in 1970 then sharply in 1971 and amounted to only 1.3 million in 1972. This has been caused by their internal production problems and also an attempt to completely internalize their hide industry and eventually only export finished leather products. Brazil also internalized the hide tanning industry and banned exports of raw hides further reducing world supply by two million hides. Recently Brazil has become an importer of raw hides and is now competing for raw hides on an international basis.

In summary, we are basically in a demand pull situation for raw hides. Foreign demand for our raw hides, which now takes over 50 percent of total U.S. produced cattlehides, will continue and possibly expand. Only the U.S., Canada and Australia remain as major raw hide exporters. Nearly all

Table 26. Exports of Cattlehides from the U.S. and Other Major Exporting Countries to Countries of Destination, 1972-1975.

Country of Destination	Unit	1972	1973	1974	1975[1/]
United States:					
Japan	1,000 pcs.	7,769	7,596	7,199	7,760
Mexico	"	1,806	2,036	2,534	2,588
Korea, Republic of	"	411	908	1,535	2,543
Romania	"	1,200	1,006	1,781	1,226
Spain	"	854	620	643	1,009
Canada	"	1,121	905	907	958
Czechoslovakia	"	857	821	676	877
Poland	"	568	766	666	866
China, Republic of (Taiwan)	"	226	332	486	864
Italy	"	263	605	434	773
USSR	"	518	48	450	660
France	"	771	591	339	510
Germany, West	"	729	656	641	440
Hong Kong	"	68	98	161	381
Hungary	"	228	201	532	262
Netherlands	"	449	160	159	239
Yugoslavia	"	459	273	226	160
Israel	"	132	140	134	152
Turkey	"	42	66	79	102
United Kingdom	"	245	199	50	61
Chile	"	261	273	134	24
Other countries	"	673	452	829	1,217
TOTAL	"	19,650	18,752	20,595	23,672
Australia					
Total Cattlehide equiv.	"	4,343	3,878	4,082	5,616
Canada					
Total Cattlehide equiv.	"	2,914	2,729	2,650	3,853
Argentina	"	1,344	--	--	--

Source: USDA, Foreign Agriculture Service, Foreign Agricultural Circular, Livestock and Meat, September, 1976.

Argentina: Tanners Council of America.

other historical exporters such as India, the Argentine and Brazil have internalized their leather tanning industries and no longer allow the export of raw hides. International demand for hides has broadened with Japan taking the lead. Korea and Taiwan have sharply increased imports and Communist Bloc countries such as Poland, Yugoslavia, Rumania and Czechoslovakia have more than doubled their imports of raw hides since 1965. As a result, we see the U.S. tanners facing continued international competition for our raw hides.

Trade Restrictions in Raw Hide Supply

Systematic restriction on exports of hides and skins appears to be the trend in developing countries. Their basic policy is to restrict exports of raw materials (hides and skins) while simultaneously encouraging exports, and restricting imports, of the manufactured goods (leather and leather products). This is done by levying taxes on exports of raw hides and skins, imposing quotas on imports; and granting incentives for exports of manufactured goods.

When raw hides and skins are converted into leather their value increases by more than two and a half times. Benefits, particularly for developing countries are derived by restricting their exports of raw hides and skins and developing their own domestic tanneries. Developing countries gain advantages by restricting their export of raw hides and increasing their export of semi-tanned leather due to the preferences given by other countries to pre-tanned leather. These advantages are the results of (1) developing countries not having the technological sophistication to develop high quality finished products; (2) primary stages of leather processing being labor intensive, and developed countries finding it difficult to attract and retain sufficient quantities of labor, and (3) developing countries being unable to keep abreast of fashion changes as readily as developed countries.

In a review of the effects of some of its more recent tariff legislation, such as The Kennedy Round, the U.S. Government has indicated its findings show little effect has been made on changing existing import-export patterns. An overview of the estimated effects of the Kennedy Round on tariff barriers dealing with raw hides and skins follows.

In 1968, one-third of the approximate $452.6 million raw hides and skins imports was supplied by developing countries to the four major import markets: EEC, the United States, Japan, and the United Kingdom. Latin American countries, i.e., Argentina, Brazil, and Uruguay are the main developing country suppliers. Prior to the Kennedy Round, entrance into major market areas was duty-free, with the exception of the United Kingdom and the United States. The Kennedy Round negotiations abolished the tariffs in these market areas which resulted in duty-free access to all four major markets.

In 1968, almost one-half of the sheep and lambskin imports were supplied by developing countries. The bigger importers were the EEC, the United Kingdom, and the United States, the latter which is also an important supplier. The Kennedy Round improved access to the four major markets and "effective protection" of processing was reduced. Japan imposed relatively high duties and quantitative restrictions on some items.

Also in 1968, eighty-seven percent of all goat and kid skin was supplied by developing countries. The major importers were the EEC, United Kingdom, United States, and Japan. The Kennedy Round resulted in improved market access and reduced the "effective protection" of major importers. Nominal duties still apply to some varieties of goat and kid leather. The resultant effect of these policies is that now only the United States, Canada, Australia and New Zealand remain as open markets for the purchase of raw goat and kid skins.

VI. MODEL PLANTS

The Leather Tanning and Finishing Industry is comprised of nearly 250 establishments which utilize variations of basic processes to produce differentiated types of leather. The Industry consists of establishments primarily engaged in tanning, currying and finishing hides and skins into leather. As this chapter is concerned with the development of economic plants representative of tanneries and leather finishers which could be effected by the imposition of hazardous waste management regulations, an attempt will be made to describe models which together will typify most tannery operations in the United States.

A. Types and Sizes of Model Plants

Tanneries vary with respect to their operating characteristics such that several models were required to be developed. However, these models do not totally represent all tanneries. Instead it is believed that the models developed represent various categories of tanneries with each respective tannery in that group having several characteristics closely associated with the models.

The general categories of tanneries utilized in this analysis are defined below:

1. Cattlehide-chrome--a tannery that primarily processes raw or cured cattle or cattle-like hides into finished leather using chrome tanning. Hide hair can either be saved or chemically dissolved.

2. Cattle-nonchrome (primarily vegetable)--a tannery that primarily processes raw or cured cattle or cattle-like hides into finished leather using less than 20 percent (by hide weight) chrome tanning; includes vegetable, alum, syntans, oils, and other methods and their combinations.

3. Cattle-to-blue--a tannery that primarily processes raw or cured cattle or cattle-like hides through the blue tanned state only, with no retaining or finishing operations, and uses chrome tanning.

4. Cattle splits (retan)--a tannery that primarily processes splits or previously tanned hides and/or skins into finished leather, the major wet process consisting of trimming, additional splitting, retanning, coloring, and fatliquoring.

5. Sheepskin tannery--a tannery that primarily processes sheepskins, with the hair previously removed, into finished leather using either chrome or nonchrome tanning methods, primarily includes pickled sheepskins. A few plants will also tan pigskins or pickled cattlehides (hair removed) and such plants will occasionally be called no-beamhouse tanneries.

7. Shearlings--a tannery that primarily processes raw or cured sheep or sheep-like skins, with the wool or hair retained on the hide, into finished leather using chrome or nonchrome tanning; or, a wool pullery--a plant that processes hair-on raw or cured sheep or sheep-like skins by first removing the wool and then pickling the skin for use by a sheepskin tannery (Category 6).

8. Leather finishers--an establishment that receives unfinished leather to which it applies a finish and may also buff to remove imperfections in the leather; does not perform any other tanning functions; normally functions on a contract basis in performing a service for a customer.

For each of the above categories at least one representative model was considered. Where there were several corresponding tanneries associated with a category, various representative sizes of models were developed for that specific category. The models and their corresponding sizes are depicted in Table 27.

Table 28 depicts the various operational characteristics of the model plants. These characteristics were determined from the industry survey as well as discussions with industry members. As is shown, operations involving cattlehides predominately operate 250 days per year utilizing approximately 85 percent of their capacity. Sheep operations commonly operate 240 days per year with sheepskin operations utilizing 75 percent of their capacity while shearling operations utilize 90 percent during 1976. Finishers are generally on a 250 day per year operation schedule using 76 percent of their capacity and measure output on a square foot basis.

To compute the annual production of the other models in terms of square footage the following standards were used:

> Cattlehides yield 40 square feet per hide; cattle splits yield 8 square feet per split; and sheepskins yield 6.67 square feet per skin or pelt.

At this time it does not appear that vegetable tanners will be impacted. This conclusion is based on information from a recent EPA study on solid waste practices in the leather industry. The study determined that a typical vegetable tanner will produce no potentially hazardous waste.[1/] Model plants were included, however, to facilitate future analysis if they are eventually required to conform to similar regulations.

[1/] SCS Engineers, Inc. Assessment of Industrial Hazardous Waste Practices -- Leather Tanning and Finishing Industry, EPA report under Contract No. 68-01-3261, Report No. PB-261-018, November 1976, p. 83-84.

Table 27. The Leather Tanning Industry, representative model plants and respective plant capacities

Model	Corresponding Category	Units	Size				
			X-Small	Small	Medium	Large	X-Large
		(Units/Day)					
Cattlehide, chrome, pulp	1	Cattlehides	100	400	900	1,500	3,000
Cattlehide, chrome, save	2	Cattlehides	100	400	900	1,500	3,000
Cattlehide, vegetable	3	Cattlehides	---	100	625	1,500	---
Cattlehide to blue only	4	Cattlehides	---	---	---	3,000	---
Cattle splits	5	Splits	---	---	4,250	---	---
Sheepskins	6	Sheepskins	---	1,200	2,400	5,800	---
Shearlings	7	Pelts	---	900	---	3,000	---
Leather Finishers	8	sq. ft.	---	---	14,000	40,000	---

Table 28. The Leather Tanning Industry, representative model plants' operational characteristics

Model/Size	Category	Capacity	Days Per Year	Utilization Rate	Hides Per Year	Square Feet Per Year	Number of Employees
		(Units/Day)		(%)			
Cattle-Chrome	1 & 2						
X-Small		100	250	85	21,250	850,000	30
Small		400	250	85	85,000	3,400,000	60
Medium		900	250	85	191,250	7,650,000	85
Large		1,500	250	85	318,750	12,750,000	150
X-Large		3,000	250	85	637,500	25,500,000	355
Cattle Vegetable	3						
Small		100	250	85	21,250	850,000	40
Medium		625	250	85	132,812	5,312,500	120
Large		1,500	250	85	318,750	12,750,000	165
Cattle to blue	4						
Large		3,000	350	85	892,500	35,700,000	120
Cattle Splits	5						
Medium		4,250	250	85	903,125	7,225,000	39
Sheepskins	6						
Small		1,200	240	75	216,000	1,440,720	20
Medium		2,400	240	75	432,000	2,881,440	40
Large		5,800	240	75	1,044,000	6,963,480	97
Shearlings	7						
Small		900	240	90	194,400	1,296,650	30
Large		3,000	240	90	648,000	4,322,160	100
Finishers	8						
Medium		14,000	250	75	65,625	2,625,000	15
Large		40,000	250	75	187,500	7,500,000	30

B. Investment

The estimated book value and salvage value for each tannery model are shown in Table 29. Also shown are current assets, current liabilities, net working capital, total invested capital and estimated replacement value.

Book Value of Assets

The book value of a tannery's assets represents the acquisition costs of the various assets. As would be expected in an industry with a substantial number of older plants and equipment, the book values of the model's assets do not reflect significant amounts. However, the book value does reflect the amount of capital the tannery owners have invested in assets and accordingly represent a portion of what is used as a basis for determining the return on the owners equity.

Operating Capital

The models' operating capital is defined as that capital necessary to maintain the day to day operations of the tanneries. Included in the computation of operating capital are a firm's current assets and current liabilities. Current assets represent those assets a firm maintains that could be converted relatively easy into cash. Current assets include such items as raw materials inventory, finished product inventory and accounts receivable.

As can be seen in Table 29, current assets for the models represent a sizeable amount. This is due to the substantial quantities of hides and leather that tanneries must maintain in their facility at any given time in order to assure continuous operation. This reflects a sizeable additional investment requirement to the tanneries owners.

Current liabilities represent those liabilities that a firm holds that could be demanded to be paid within a short time period. Current liabilities include short term notes, accounts payable and wages payable.

The difference between current assets and current liabilities represent the firm's operating capital or as it is sometimes called, net working capital. Net working capital represents the quantity of capital that the firm is required to maintain just to maintain daily cash balances. Thus it represents an investment requirement to the tanneries' owners.

Total Invested Capital

Total invested capital is the sum of the book value of assets and the net working capital. It represents the total amount of capital that is required to be invested in an operation by the owners. Accordingly the total invested capital represents the investment amount utilized for determining a firm's return on investment.

Table 29. The Leather Tanning Industry, representative model plants investment characteristics

Model/Size	Capacity	Fixed Assets	Current Assets	Current Liabilities	Net Working Capital	Total Invested Capital	Salvage Value
	(Units/Day)	------------------------------		($1,000)			------------------------------
Cattle-Chrome							
X-Small	100	291.0	269.0	205.3	63.7	354.7	121.9
Small	400	448.0	772.0	371.2	400.8	848.8	490.4
Medium	900	1,080.0	1,467.0	819.6	647.4	1,727.4	863.4
Large	1,500	1,995.0	2,895.0	1,258.7	1,636.3	3,631.3	2,035.3
X-Large	3,000	3,990.0	5,790.0	2,517.4	3,272.6	7,262.6	4,070.6
Cattle-Vegetable							
Small	100	230.0	500.0	170.0	330.0	560.0	376.0
Medium	625	415.6	2,487.5	787.5	1,700.0	2,115.6	1,783.1
Large	1,500	870.0	3,390.0	1,080.0	2,310.0	3,180.0	2,484.0
Cattle-to-Blue							
Large	3,000	2,510.0	3,650.0	1,590.0	2,060.0	4,570.0	1,184.0
Cattle-Splits							
Medium	4,250	233.8	701.2	340.0	361.2	595.0	384.6
Sheepskins							
Small	1,200	72.0	60.0	48.0	12.0	84.0	19.2
Medium	2,400	201.7	120.0	96.0	24.0	225.7	44.2
Large	5,800	557.1	290.0	232.0	58.0	615.1	113.7
Shearlings							
Small	900	648.3	90.0	36.0	54.0	702.3	118.8
Large	3,000	2,161.1	300.0	120.0	180.0	2,341.1	396.1
Finishers							
Medium	14,000 ft.^{2}	94.7	42.0	21.0	21.0	115.7	43.1
Large	40,000 ft.^{2}	189.3	126.0	63.0	63.0	252.3	107.3

Total invested capital requirements for the model tanners range from $84,000 for a small sheepskin tannery to nearly $7.3 million for the extra-large cattlehide chrome tannery. Each model's total invested capital requirement is depicted in Table 29.

Salvage Value

The salvage value of the model tanneries represents the amount of money that the owners could recover should the tannery cease operation. This value will vary widely from plant to plant, depending on the age of the facility and its condition and the use ability of the equipment as well as the location of the plant. In some instances the salvage value of old, obsolete plants will be equal to the site value plus the scrap value of the equipment.

There exist only a limited market for certain types of used machinery and equipment. Thus most of a closing plant's equipment would be scraped.

Data are not available depicting the salvage value of tanneries. Accordingly after discussions with industry members it was determined that salvage values for most tanneries would range between 10 and 20 percent of the tannery's fixed assets plus its net working capital.

C. Model Plant Capacity and Utilization

As tanneries vary from one to another, there appears to be no industry rule by which the models' capacity or utilization can be accurately described. For most tanneries their constraining factor is the number and capacity of their drums (or for some tanners, the number and capacity of their pits).

Commonly, tanneries will operate 5 days per week for 240 to 250 days per year. Furthermore, their utilization rates vary for the different types of tanneries, however usually the rates range between 75 and 90 percent of the tanneries' capacity. The capacity and utilization rates for each of the representative model plants were depicted in Table 28.

D. Annual Sales of Model Plants

Annual sales of the model plants were determined utilizing the production characteristics described in Table 28 as well as estimates of final product prices. Prices were estimated to be reflective of the average grade and quality of leather within each tannery type. Prices are representative of late 1975 early 1976.

The prices utilized in this analysis are depicted below:

Type	Price	Source
Cattlehide, Chrome	$ .86/sq. ft.	Wholesale Price Index Cattle & Kip Sides, Smooth Oct.-Dec. 1975 Average
Cattlehide, Vegetable	$ .94/sq. ft.	From industry surveys
Cattlehides to the Blue	$ .508/sq. ft.	From industry surveys and contacts
Cattle, Splits	$ .234/sq. ft.	From industry surveys
Sheepskins	$ .726/sq. ft.	From industry surveys
Shearlings	$1.15/sq. ft.	From industry surveys
Leather Finishers (on contract)	$ .15/sq. ft.	From industry contacts

The annual sales for each of the tannery models are shown in Tables 30 through 33.

E. Cost Structure of Model Plants

The cost structures for each tannery model are depicted in Tables 30, 31, 32, and 33. The major cost items are discussed below.

Raw Material

Raw materials for purposes of this analysis consisted entirely of raw cattle hides or splits, or sheep skins or pelts. Raw cattlehides are sold by slaughterhouses on a poundage basis and this analysis assumed the average hide weighed 55 pounds. Prices utilized reflected the October through December 1975 average price for Chicago Native Heavy hides. The price was 28.7 cents per pound.

The price utilized for raw cattle splits was determined from industry surveys and is estimated to be $.72 per split.

Raw sheepskin prices were assumed to be $1.75 per skin. These would be received in the pickled state. The price for sheep pelts was estimated to be $4.00 per pelt. Both the sheep skin and sheep pelt prices were estimated utilizing the industry surveys.

Since the leather finishers are on a contract basis, they normally do not experience raw material costs associated with the purchase of hides.

Labor

Labor costs were developed using the estimated number of employees for each model plant multiplied times an estimate of the annual costs per employee. These costs were developed from industry provided data and reflect varying wages for different types and sizes of tanneries.

Table 30. The Leather Tanning Industry, Representative Model Plants' Costs Characteristics for the Cattlehide Chrome Tanneries.

	CATTLEHIDE CHROME TANNERIES									
	Extra Small		Small		Medium		Large		Extra Large	
	1000 Dollars	Percent	1000 Dollars	Percent	1000 Dollars	Percent	1000 Dollars	Percent	1000 Dollars	Percent
SALES	$731.0	100.0	$2,924.0	100.0	$6,579.0	100.0	$10,965.0	100.0	$21,930.0	100.0
COSTS										
Raw Hides	335.4	45.9	1,341.7	45.9	3,018.9	45.9	5,031.5	45.9	10,063.0	45.9
Labor	189.0	25.8	452.4	15.5	688.5	10.5	1,303.5	11.9	3,124.0	14.2
Tan Materials & Other	138.2	18.9	825.8	28.2	2,246.6	34.1	3,741.9	34.1	6,440.0	29.4
TOTAL	662.6	90.6	2,619.9	89.6	5,954.0	90.5	10,076.8	91.9	19,627.4	89.5
CASH EARNINGS	68.4	9.4	304.1	10.4	625.0	9.5	888.2	8.1	2,302.6	10.5
LESS										
Depreciation	17.5	2.4	64.3	2.2	131.6	2.0	185.4	1.7	372.8	1.7
Interest	11.0	1.5	29.2	1.0	85.5	1.3	109.7	1.0	219.3	1.0
PRE-TAX INCOME	39.9	5.5	210.6	7.2	407.9	6.2	592.1	5.4	1,710.5	7.8
INCOME TAX	8.3	1.2	87.6	3.0	182.3	2.8	270.7	2.5	807.5	3.7
AFTER-TAX INCOME	31.6	4.3	123.0	4.2	225.6	3.4	321.4	2.9	903.0	4.1
CASH FLOW	49.2	6.7	187.3	6.4	357.2	5.4	507.8	4.6	1,275.8	5.8

Table 31. The Leather Tanning Industry, representative model plants' costs characteristics for the cattlehide vegetable tanneries, the cattlehide blue tannery and the cattlehide split tannery

	Vegetable Tanneries						Cattle-to-Blue		Split Tannery	
	Small		Medium		Large					
	($000)	(%)	($000)	(%)	($000)	(%)	($000)	(%)	($000)	(%)
SALES	799.0	100.0	4,993.7	100.0	11,985.0	100.0	18,150.0	100.0	1,690.7	100.0
COSTS										
Raw Hides	335.4	42.0	2,096.4	42.0	5,031.4	42.0	14,235.0	78.4	650.3	38.5
Labor	293.0	36.7	879.0	17.6	1,523.8	12.7	1,267.0	7.0	280.0	16.6
Tan Materials & Other	106.7	13.3	1,673.7	33.5	4,854.5	40.5	1,527.0	8.4	614.2	36.3
TOTAL	735.1	92.0	4,649.1	93.1	11,409.7	95.2	17,029.0	93.8	1,545.3	91.4
CASH EARNINGS	63.9	8.0	344.6	6.9	575.3	4.8	1,121.0	6.2	145.4	8.6
LESS										
Depreciation	14.4	1.8	74.9	1.5	143.8	1.2	186.0	1.0	30.4	1.8
Interest	1.6	0.2	25.0	0.5	155.8	1.3	74.0	0.4	16.9	1.0
PRE-TAX INCOME	47.9	6.0	244.7	4.9	275.7	2.3	861.0	4.8	98.1	5.8
INCOME TAX	10.0	1.3	104.0	2.1	118.9	1.0	400.0	2.2	33.6	2.0
AFTER-TAX INCOME	37.9	4.7	140.7	2.8	156.8	1.3	461.0	2.6	64.5	3.8
CASH FLOW	52.3	6.5	215.6	4.3	300.6	2.5	647.0	3.6	94.9	5.6

Table 32. The Leather Tanning Industry, Representative Model Plants' Costs Characteristics for the Sheep and Shearling Tanneries.

	SHEEPSKIN TANNERIES						SHEARLING TANNERIES			
	Small		Medium		Large		Small		Large	
	1000 Dollars	Percent	1000 Dollars	Percent	1000 Dollars	Percent	1000 Dollars	Percent	1000 Dollars	Percent
SALES	1046.0	100.0	2091.9	100.0	5055.5	100.0	1491.2	100.0	4970.5	100.0
COSTS										
Raw Skins or Pelts	378.0	36.1	756.0	36.1	1827.0	36.1	777.6	52.1	2592.0	52.1
Labor	160.7	15.4	321.4	15.4	779.4	15.4	272.3	18.3	907.7	18.3
Tan Materials & Other	459.2	43.9	905.7	43.3	1948.6	38.5	214.6	14.4	715.3	14.4
TOTAL	997.9	95.4	1983.1	94.8	4555.0	90.0	1264.5	84.8	4215.0	84.8
CASH EARNINGS	48.1	4.6	108.8	5.2	500.5	10.0	226.7	15.2	755.5	15.2
LESS										
Depreciation	10.5	1.0	20.9	1.0	50.5	1.0	44.8	3.0	149.1	3.0
Interest	3.1	0.3	10.5	0.5	50.6	1.0	37.3	2.5	124.3	2.5
PRE-TAX INCOME	34.5	3.3	77.4	3.7	399.4	7.9	144.6	9.7	482.1	9.7
INCOME TAX	7.1	0.7	23.7	1.1	178.2	3.5	55.9	3.8	217.2	4.4
AFTER-TAX INCOME	27.4	2.6	53.7	2.6	221.2	4.4	88.7	5.9	264.9	5.3
CASH FLOW	37.9	3.6	74.6	3.6	271.7	5.4	133.5	8.9	414.0	8.3

Table 33. The Leather Tanning Industry, representative model plants' costs characteristics for the leather finishers

Financial Item	Leather Finishers (on contract)			
	Medium		Large	
	($000)	(%)	($000)	(%)
SALES	394.0	100.0	1,125.0	100.0
COSTS				
Raw Hides	---	---	---	---
Labor	162.0	41.0	324.0	28.8
Finishing Chemicals	135.0	34.0	400.0	35.6
Other	78.0	20.0	288.0	25.6
TOTAL	375.0	95.0	1,012.0	90.0
CASH EARNINGS	19.0	5.0	113.0	10.0
LESS				
Depreciation	8.5	2.2	16.9	1.5
Interest	3.9	1.0	9.0	0.8
PRE-TAX INCOME	6.6	1.8	87.1	7.7
INCOME TAX	1.3	0.3	28.3	2.5
AFTER-TAX INCOME	5.3	1.5	58.8	5.2
CASH FLOW	13.8	3.7	75.7	6.7

For the cattlehide chrome tanneries annual per employee labor costs ranged from $6,300 for the extra small model to $8,800 for the extra large model. For the cattle hide, vegetable tanneries annual labor costs were estimated to be $7,325 per employee for the small and medium model and $9,235 for the large tannery model. Labor costs for split tanners were estimated to be $7,200 per year; cattle-to-blue tannery, $8,000 per year; for sheepskin tanners, $8,035; for shearling tanners, $9,200 per year; and for leather finishers, $9,000 per annum.

Tanning Materials and Other Costs

This cost classification includes expenditures for materials used in the tanning process, miscellaneous other direct costs as well as indirect costs (i.e., administrative expenses). These costs vary considerably for different tanneries and for the models. For cattlehide and sheepskin tanners, they ranged between 13.3 and 43.9 percent of sales. Leather finishers relative cost for such items were even higher, ranging from 54.0 to 61.2 percent of sales. This high percent is because of the absence of raw material costs in most leather finishing operations.

Depreciation and Interest

Estimates of model tanneries' depreciation and interest were developed from industry as well as Internal Revenue Service data. The depreciation amounts utilized in this analysis are depicted in Table 34. In this table depreciation is expressed as a percent of sales as well as fixed assets. In terms of sales depreciation represents between 1.0 and 3.0 percent. Expressed as a percentage of fixed assets depreciation represents between 1.0 and 18.0 percent. This wide variation in depreciation as a percent of fixed assets is reflective of the wide variation of plant and equipment composition that exists in the industry.

Interest charges for the model plants, expressed as a percent of sales, are also shown in Table 34. Interest charges ranged from 0.2 percent of sales to 2.5 percent.

Total Costs

Raw hides or skins costs ranged from 36.1 percent of sales for the sheepskin tanneries to 52.1 percent for the shearling tanneries. The cattle tanneries raw hide costs approximated 40 percent. Labor costs ranged from 10.5 percent of sales for the medium cattle chrome tannery model to 36.7 percent for the small cattle vegetable model. The majority of the models' labor costs represented 10 to 20 percent of sales, except for leather finishers where labor costs represent 30 to 40 percent of sales. Finally expenditures for tanning materials and other direct and indirect costs ranged from 13.3 percent for the small cattle vegetable model to 43.9 percent of sales for the small cattle chrome tannery model to 61.2 percent for a large leather finisher.

As previously mentioned these costs are depicted for all the models on Table 30 through 33. Total costs of all the models, including depreciation and interest, represent between 90.3 percent and 97.7 percent of sales. This would result in a pre-tax income range of 2.3 to 9.7 percent.

Table 34. The Leather Tanning Industry, representative model plant depreciation and interest

Model/Size	Depreciation Percent of Sales	Depreciation Percent of Fixed Assets	Interest as a Percent of Sales
	--------------------Percent	--------------------	--------------------
Cattle-Chrome			
X-Small	2.4	6.0	1.5
Small	2.2	14.4	1.0
Medium	2.0	12.2	1.3
Large	1.7	9.3	1.0
X-Large	1.7	9.3	1.0
Cattle-Vegetable			
Small	1.8	6.3	0.2
Medium	1.5	18.0	0.5
Large	1.2	16.5	1.3
Cattle-to-Blue			
Large	1.0	7.4	0.4
Cattle Splits			
Medium	1.8	13.0	1.0
Sheepskins			
Small	1.0	1.4	0.3
Medium	1.0	1.0	0.5
Large	1.0	1.3	1.0
Shearlings			
Small	3.0	6.9	2.5
Large	3.0	6.9	2.5
Finishers			
Medium	2.2	9.0	1.0
Large	1.5	8.9	0.8

F. Model Plant Annual Profits

After-tax income, pre-tax and after-tax return on sales and return total invested capital for the various model tanneries are shown in Table 35. These profitabilities reflect late 1975 conditions. As shown in the table the models' return on sales, after-tax, range from 1.3 percent to 5.9 percent. After-tax return on total invested capital range from 2.1 percent to 23.3 percent.

G. Annual Cash Flows

Estimated annual cash flows for the different types and sizes of model tanneries are depicted in Table 36. Cash flow, as calculated, represents the sum of after-tax income plus depreciation. In the table it is shown in actual dollars as well as expressed as a percent of sales and total invested capital.

Table 35. The Leather Tanning Industry, representative model plant profitability

Model/Size	After-Tax Income	Return of Sales		Return of Total Invested Capital	
		Pre-Tax	After-Tax	Pre-Tax	After-Tax
	($000)	(Percent)			
Cattle-Chrome					
X-Small	31.6	5.5	4.3	11.3	8.9
Small	123.0	7.2	4.2	24.8	14.5
Medium	225.6	6.2	3.4	23.6	13.1
Large	321.4	5.4	2.9	16.3	8.9
X-Large	903.0	7.8	4.1	23.6	12.4
Cattle-Vegetable					
Small	37.9	6.0	4.7	8.6	6.8
Medium	115.3	4.9	2.8	11.6	6.7
Large	156.8	2.3	1.3	8.7	4.9
Cattle-to-Blue					
Large	461.0	4.8	2.6	18.8	10.1
Cattle Splits					
Medium	64.5	5.8	3.8	16.5	11.0
Sheepskins					
Small	27.4	3.3	2.6	4.1	2.1
Medium	53.7	3.7	2.6	3.4	2.4
Large	221.2	7.9	4.4	6.5	3.0
Shearlings					
Small	88.7	9.7	5.9	20.6	12.6
Large	264.9	9.7	5.3	20.6	11.3
Finishers					
Medium	5.3	1.8	1.5	5.7	4.6
Large	58.8	7.7	5.2	34.5	23.3

Table 36. The Leather Tanning Industry, representative model plant cash flow

Model/Size	Annual Cash Flow	Cash Flow as a Percent of Sales	Cash Flow as a Percent of Total Invested Capital
	($000)	(Percent)	
Cattle-Chrome			
X-Small	49.2	6.7	13.9
Small	187.3	6.4	22.1
Medium	357.2	5.4	20.7
Large	507.8	4.6	14.0
X-Large	1,275.8	5.8	17.6
Cattle-Vegetable			
Small	52.3	6.5	9.3
Medium	215.6	4.3	10.2
Large	300.7	2.5	9.5
Cattle-to-Blue			
Large	647.0	3.6	14.2
Cattle Splits			
Medium	94.9	5.6	16.0
Sheepskins			
Small	37.9	3.6	3.4
Medium	74.7	3.6	3.3
Large	271.7	5.4	4.4
Shearlings			
Small	133.4	8.9	19.0
Large	414.0	8.3	17.7
Finishers			
Medium	13.8	3.7	11.9
Large	75.7	6.7	30.0

VII. HAZARD WASTE MANAGEMENT COSTS

Hazardous waste management requirements and costs depicted in this chapter were provided by the Hazardous Waste Management Division, Office of Solid Waste of the Environmental Protection Agency as developed by the technical contractors Battelle Columbus Laboratories 1/ and SCS Engineers, Inc. 2/. These studies contained the basic data on hazardous waste management, which were expanded to apply to all the alternative model plants developed in the previous chapter.

A. Hazardous Waste Management Guidelines and Recommendations

Specific government guidelines are currently unavailable for either identification of hazardous waste or treatment and disposal technology. Thus, the technology, proposed so far, represents a state-of-the-art level which is selected as "an environmentally acceptable disposal technology" for various "hazardous" waste streams. Such technology is currently classified as Pathways Level III (PAIII) technology. In light of the lack of guidelines, the actual PAIII facilities and costs analyzed in this report are preliminary as they may be revised after regulations and guidelines are finally adopted 3/.

B. Hazardous Waste Management Treatment and Disposal Technology

The bulk of tanneries' solid waste stream is comprised of pieces of leather from various plant operations and wastewater treatment sludge. For non-vegetable tanners, most of this waste stream will contain hazardous waste, primarily trivalent chromium with some lead, zinc and copper. As stated earlier, vegetable tanners will usually not produce hazardous waste.

According to the treatment and disposal cost study, the PAIII technology for the hazardous waste stream generated by the leather tanning and finishing industry will be a secured landfill 4/. This is the compatible technology for a waste stream containing hazardous solid and sludge waste.

The secure landfill (sometimes referred to as a "secure chemical landfill" or a "chemical landfill"), as designated in this report, is one that will provide complete long-term protection for the quality of surface and subsurface waters from hazardous waste deposited therein and against hazards to public health and the environment.

1/ Battelle Columbus Laboratories, Cost of Complying with Hazardous Waste Management Regulations, Draft Report, Environmental Protection Agency, Contract No. 68-01-4360, Columbus, Ohio, October 12, 1977.

2/ SCS Engineers, Inc., Assessment of Industrial Hazardous Waste Practices--Leather Tanning and Finishing Industry, Environmental Protection Agency, Report No. PB-261018, Reston, Virginia, November 1976.

3/ Battelle, op. cit., pp III-1 to III-2.

4/ Ibid., p VI-7.

The secure landfill has special features beyond those possessed by "sanitary" or "approved sanitary" landfills which enable it to handle hazardous wastes in an environmentally adequate manner. Some of the special features or criteria required for secure landfills are presented below:

- Secure landfill sites should be located or engineered to avoid direct hydraulic continuity with surface or sub-surface waters. If there is potential for hazardous wastes to percolate or leach to ground water, then the use of impermeable barriers, such as clay, special concrete, plastic and other liners, will be required to accomplish suitable containment and isolation of wastes.

- Facilities for leachate collection and treatment are essential for liquid, low-solids slurries, sludges, or other wastes from which soluble constituents might be leached. Leachate may be collected by the use of suitable piping at the bottom of the cell and a sump pump. After suitable treatment, any dewatered solids can be returned to the disposal site and the effluent can be discharged to a sewer or stream.

- Surveillance and monitoring of the disposal site, including regular analysis of ground and surface waters for changes in background levels, are necessary.

- The composition and volume of each extremely hazardous waste is known. Care is taken to segregate wastes to prevent potentially dangerous reactions. The location of specific wastes in the cells is recorded and mapped. Neutralization, chemical fixation, encapsulation, and other pretreatment techniques are often necessary prior to burial of some wastes in a secure landfill.1/

C. Status of Industry Hazardous Waste Management

Most tanneries dispose hazardous waste in conventional sites including dumps, landfills, trenches and lagoons. A recent study covering 136 tanneries, showed 8 percent used open dumps, 73 percent used landfills, 18 percent disposed of waste in trenches or lagoons and one tannery utilized agricultural spreading. The 136 tanneries were serviced by 23 disposal sites of which eight were publically owned and served 52 tanneries, five tanneries owned their own sites and 10 sites serving 56 tanneries were privately owned. Thus 79 percent of the tanners use privately or publically owned sites while 21 percent maintain company sites. Of the 23 disposal sites, only 2 were state certified to accept hazardous waste.2/

1/ Ibid., pp 37 and 38.
2/ SCS Engineers, Inc., op. cit., p. 138.

After tanners finally adopt requirements for hazardous waste management regulations, the prior distribution of management techniques will change as some of the current disposal sites would not be approved to handle solid waste. However, at this time the extent of the shift cannot be estimated.

D. Hazardous Waste Management Costs

Hazardous waste management costs are based on the industry waste stream category, Pathways Level III technology applied, and level of waste generated, as provided from studies by EPA contractors listed previously.

Costs depicted and discussed in this section apply only to the treatment and disposal of solid and sludge waste in a PAIII technology, specifically secure landfill. Costs supplied by the EPA cost contractor are an industry average to cover contract hauling and disposal. For the Leather Tanning and Finishing Industry, this cost was estimated to average $55 per metric ton per year for any plant in the industry. In the EPA study, no allowances were included for plant location, size, or process. As some disposal costs exist prior to adoption of PAIII technology, the impact must be assessed on the incremental cost increases, which according to the same report equal $37 per metric ton per year.

Costs are expressed in January 1, 1977 dollars. They are costs for a service rendered for which little or no investment costs will usually be incurred.

Yearly costs for various types of plants will vary depending on volume of waste generated. This is estimated for model plants based on documented average potentially hazardous solid waste produced per thousand equivalent hides processed[1] times hides processed annually. As there are no assumed investment costs, neither depreciation nor interest costs on investment will be generated. Total annual costs and costs per 1,000 equivalent hides produced are shown in Table 37.

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[1] SCS Engineers Inc., op. cit., pp. 61-121.

Table 37. Hazardous waste treatment and disposal costs for leather tanners and finishers based on incremental costs of $37 per MT 1/

Type of tanner	Volume of production per day	Annual equivalent hide production2/ (1,000)	P.H.W. 3/ M.T per 1,000 equiv. hides (1977 levels)	Incremental costs per 1,000 equiv. hides $	Total annual incremental costs
Cattlehide - pulp chrome					
X-small	100 hides	21.3	4.9	181	3,860
Small	400 hides	85.0	4.9	181	15,380
Medium	900 hides	191.3	4.9	181	34,630
Large	1,500 hides	318.8	4.9	181	57,700
X-Large	3,000 hides	637.5	4.9	181	115,390
Cattlehide - blue	3,000 hides	893	10.0	370	330,410
Cattle-splits	4,250 splits	180.6	8.6	318	57,430
Sheepskins					
Small	1,200 skins	36	1.66	61	2,200
Medium	2,400 skins	72	1.66	61	4,390
Large	5,800 skins	174	1.66	61	10,610
Shearlings					
Small	900 pelts	32.4	1.66	61	1,980
Large	3,000 pelts	108.1	1.66	61	6,590
Leather Finisher					
Medium	14,000 sq ft	65.6	0.16	6	390
Large	40,000 sq ft	187.5	0.16	6	1,120

1/ Pathway Level III cost less current treatment and disposal costs: $55/MT - $18/MT = $37/MT

2/ Equiv. hide = 40 sq ft, split = 8 sq ft and sheepskin = 6.67 sq ft

3/ P.H.W. = Potentially Hazardous Waste

VIII. ECONOMIC IMPACT ANALYSIS

The resulting direct impacts arising from hazardous waste management regulation for the Leather Tanning and Finishing Industry are expected to vary for different types, however, the overall industry impacts should be minor. The assumed control technology to meet regulations is disposal in secured landfills, Pathways Level III technology. Little or no investment will be required relative to this disposal method and essentially all impacts will originate from increased operating costs to pay for collecting, hauling and disposing of the waste stream. Some of these costs would be incurred without regulation as most of the hazardous waste is currently being disposed of in landfills and/or dumps but charges for use of these facilities are significantly less than for secured landfills. Ultimately, the impact analysis will assess the incremental or change in costs to go from present technology to regulation required technology, secured landfills.

This chapter will address itself to the various types of impacts for each of the different tannery categories that produce hazardous waste. As vegetable tanners do not generally produce significant amounts of hazardous waste, they will be excluded from the impact analysis. This results in an impacted industry that potentially could include about 220 plants based on 1976 data. The impacts on these plants will be simulated by applying added costs to the model tanneries described in Chapter VI. The impacts are based on the production and financial characteristics of the models and the waste management costs as presented in Chapter VII.

A. Price Effects

Required Price Increases

An implicit indication of the expected price effects of hazardous waste management regulations used in this report is the amount of sales price increase necessary to maintain a tannery's profitability, after related regulation expenditures, equal to profits before the regulation. The method of computation was described in Chapter II (Methodology), Section F, of this report. The ability to actually pass on such costs is evaluated in the next section.

The amount of sales price increases necessary to offset the estimated hazardous waste management costs for the model tanneries are shown in Table 38. Note that the required increases are estimated to be constant for all sizes of plants. This reflects the assumption by the technical contractor for EPA that costs per metric ton of waste are constant for plants producing a waste stream disposed in secured landfills. Also shown in the table are the sensitivity ranges of required price increases when costs vary ±20 percent of original estimated management costs.1/

1/ After the ±20 percent sensitivity test was reviewed, the sensitivity analysis for thru-to-blue and split tanners was expanded to ±40 percent to obtain additional information on the financial vulnerability of these more highly impacted segments. Some of the results of the ±40 percent test are included in the text but not in the tables.

Table 38. Required price increases necessary to offset hazardous waste management costs for the Leather Tanning and Finishing Industry

	Required price increase (%)		
	% of proposed waste management		
Model plant segment	80	100	120
Cattlehide - chrome (all sizes)	0.4	0.5	0.6
Cattlehide - thru-to-blue	1.5	1.8	2.2
Cattlehide - splits	2.7	3.4	4.1
Sheepskins (all sizes)	0.2	0.2	0.3
Shealings (d.o.)	0.1	0.1	0.2
Leather finishers (d.o.)	0.1	0.1	0.2

The required price increase for cattlehide chrome tanneries are 0.5 percent of the recent price level. Plants tanning cattlehides thru-to-blue will require price increases of about 1.8 percent of recent prices to maintain profits. Cattlehide split tanners would need to increase prices 3.4 percent while sheepskin, shearling and leather finishing operations would require price increases of 0.2 percent or less.

Based on estimated costs, the industry would generally not require major price increases to maintain profits. However, thru-to-blue and, in particular, split tanneries would require significant price increases. These higher levels reflect the fact that their product value is lower than other tanning segments and for split tanneries, their waste generated per unit of product is much higher than other types of tanneries.

Expected Price Increase

The Leather Tanning and Finishing Industry is an extremely competitive industry in which tanners operate on small profit margins. Primarily because of the strong competition from non-impacted foreign tanners, domestic tanners will have little success in passing on significant price increases to recover costs specifically generated by new waste management regulations. Also, since the percent of the required price increase that can likely be passed on is relatively small, it is difficult to measure with given historical data shortages and limited forecasting techniques. Fortunately, most of the required price increases are small, except for split tanneries, and represent a nominal portion of prices.

Split tanners face the highest relative impacts when considering required price increases. This is the result of two factors. First, their waste loads are high. Second and most important, they generally produce a lower priced product. In this study, split leather was valued at less than 25¢ per square foot whereas chrome tan cattlehide leather was valued at 86¢ per square foot (approx. 1975 price levels). Thus, a 3.4 percent required price increase represents only about $.008 per square foot in absolute costs. The ability of the split tanners to pass this $.008 per square foot on to consumers will depend on demand for their product, competition from foreign leather and leather goods, sales effectiveness of tanners, and competition from synthetics. These variables cannot be estimated but in general it is believed that split tanners will be able to pass on less than half of the costs which would increase the costs of splits less than $.004 per square foot.

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B. Financial Effects

Based on model tannery profiles described in Chapter VI and the estimated costs of waste management regulations provided by EPA, the following financial indicators are computed under baseline (without costs of regulations) and with costs of regulations:

1. After-tax income,
2. After-tax return on sales,
3. After-tax return on invested capital,
4. Cash flow,
5. Cash flow as a percent of invested capital,
6. Net present value.

The above are computed for each tannery model according to the discounted cash flow (DCF) and return on investment (ROI) procedures outlined in the methodology chapter, Chapter II. Furthermore, a sensitivity analysis is performed for each model using hazardous waste management cost estimates at levels of 80 and 120 percent of those provided by EPA.

The results of the model tannery analysis of the recommended pretreatment standards are summarized in Tables 39, 40, and 41, for each tannery model. The results are described below for each category of tannery models.

Cattlehide, Chrome

After-Tax Income. As shown in Table 39, the costs for hazardous waste management for cattlehide, chrome tannery models results in major to moderate reductions in the five models' income depending on size of operation.

Expressed as a percent of the baseline incomes, the costs of regulations reduce after-tax incomes by 22 percent for the extra small model, 12 percent for the small model, 11 percent for the medium model, 12 percent for the large model, and 7 percent for the extra large model.

Return on Sales. As would be expected with the above indicated declines in after-tax incomes, the impacted models' returns on sales declined by a corresponding percentage (Table 39). The impacted models' (extra small through extra large) absolute declines of returns on sales range from 0.7 percent for the extra small model to 0.3 percent or less for the large and extra large models.

Return on Invested Capital. The baseline and impacted cattlehide, chrome tannery models' returns on invested capital are also shown in Table 39. The imposition of waste management regulations on these models result in their ROI's being reduced in absolute percentages from 1.5 percent to 0.9 percent with reductions again decreasing as the size of model increases.

Cash Flow. Relevant information concerning the cattlehide, chrome tannery models' cash flows are depicted in Table 40. As can be seen in the table, the various models' cash flows are reduced, however, the reductions are not as great as were incurred by the models' incomes. For the models, the cash flows declined by as much as 12 percent for the extra small model to as little as 5 percent for the extra large model.

Table 39. Impacts of hazardous waste management regulations, Leather Tanning and Finishing Industry

	After-tax Income ($000)				After-tax Return on Sales (%)				After-tax Return on Investment Capital (%)			
		% of Proposed Waste Management Costs				% of Proposed Waste Management Costs				% of Proposed Waste Management Costs		
Segment/Model Size	Baseline Case	80%	100%	120%	Baseline Case	80%	100%	120%	Baseline Case	80%	100%	120%
Cattlehide - Chrome												
X-Small	32	26	25	25	4.3	3.5	3.5	3.4	8.9	7.2	7.1	7.0
Small	123	110	108	106	4.2	3.7	3.7	3.6	14.5	12.9	12.7	12.5
Medium	226	204	201	197	3.4	3.1	3.0	3.0	13.1	11.8	11.6	11.4
Large	321	290	284	278	2.9	2.6	2.6	2.5	8.9	8.0	7.8	7.7
X-Large	903	848	836	824	4.1	3.9	3.8	3.8	12.4	11.7	11.5	11.3
Cattlehide - Thru to Blue												
Large	461	317	282	248	2.5	1.7	1.6	1.4	10.1	6.9	6.2	5.4
Cattlhide - Splits												
Medium	65	34	28	22	3.8	2.0	1.6	1.3	10.8	5.7	4.6	3.6
Sheepskins												
Small	27	24	23	23	2.6	2.2	2.2	2.2	32.6	28.0	27.7	27.5
Medium	54	45	44	44	2.6	2.1	2.1	2.1	23.8	19.9	19.7	19.5
Large	221	210	209	208	4.4	4.1	4.1	4.1	36.0	34.1	33.9	33.7
Shearlings												
Small	89	81	81	80	5.9	5.4	5.4	5.4	12.6	11.5	11.5	11.5
Large	265	254	254	253	5.3	5.1	5.1	5.1	11.3	10.9	10.8	10.8
Leather Finishers												
Small	5	5	5	5	1.3	1.2	1.2	1.2	4.6	4.2	4.2	4.1
Large	59	51	51	51	5.2	4.6	4.6	4.5	23.3	20.3	20.3	20.3

Table 40. Impacts of hazardous waste management regulations on cash flows, Leather Tanning and Finishing Industry

Segment/Model Size	CASH FLOW ($000) Baseline Case	CASH FLOW ($000) % of Proposed Waste Management Costs 80%	100%	120%	CASH FLOW AS % OF INVESTED CAP. (%) Baseline Case	CASH FLOW AS % OF INVESTED CAP. (%) % of Proposed Waste Management Costs 80%	100%	120%
Cattlehide-Chrome								
X-Small	49	43	43	42	13.9	12.2	12.0	11.9
Small	187	174	172	171	22.1	20.5	20.3	20.1
Medium	357	336	332	329	20.7	19.4	19.2	19.0
Large	508	477	471	465	14.0	13.1	13.0	12.8
X-Large	1,276	1,221	1,209	1,197	17.6	16.8	16.6	16.5
Cattlehide: Thru to Blue								
Large	647	503	468	434	14.2	11.0	10.2	9.5
Cattlehide- Splits								
Medium	95	64	58	52	15.9	10.8	9.8	8.8
Sheepskins								
Small	38	34	34	34	45.1	40.5	40.2	40.0
Medium	75	66	65	65	33.1	29.2	29.0	28.8
Large	272	260	259	258	44.2	42.3	42.1	42.0
Shearlings								
Small	134	126	125	125	19.0	17.9	17.9	17.8
Large	414	404	403	402	17.7	17.2	17.2	17.2
Leather Finishers								
Small	14	13	13	13	11.9	11.6	11.5	11.5
Large	76	68	68	68	30.0	27.0	27.0	27.0

Table 41. Impacts of hazardous waste management regulations on net present values, Leather Tanning and Finishing Industry

Segment/Model Size	Baseline Case	NET PRESENT VALUES ($000) % of Proposed Waste Management Costs 80%	100%	120%
Cattlehide-Chrome				
X-Small	199	184	181	177
Small	788	730	715	700
Medium	1,682	1,550	1,517	1,484
Large	1,687	1,467	1,412	1,357
X-Large	5,820	5,380	5,270	5,160
Cattlehide: Thru to Blue				
Large	3,514	2,256	1,941	1,626
Cattlehide-Splits				
Medium	283	64	10	-45
Sheepskins				
Small	222	214	212	210
Medium	441	424	420	416
Large	2,107	2.066	2,056	2,046
Shearlings				
Small	826	818	816	814
Large	2,613	2,588	2,582	2,576
Leather Finishers				
Small	39	36	36	35
Large	427	423	422	420

Cash flows as percents of invested capital decline from as much as 1.9 percentage points for the extra small to 1.0 percentage points for the extra large tannery model.

Net Present Values. The net present values for the cattlehide, chrome tannery models are all positive in both the baseline case as well as after incurring expenditures for hazardous waste management (Table 41). This implies that it would be probable that model tanneries could remain in operation after meeting the regulations and remain financially stable, assuming all other factors are constant.

Cattlehides - Thru to the Blue Tanneries

As shown previously, there are a limited number of thru-to-blue tanneries, three known. Furthermore, the operation of these plants has been sporadic in recent years with plants closing down periodically due to supply shortages, operational losses or changes of ownership. Therefore, the impacts on the model plant for these operations must be viewed cautiously as, at best, they only reveal general tendencies of impact levels for this highly fluctuating segment. With this in mind, the estimated impacts show the possibility for significant declines in some financial parameters. After-tax income, return on sales, and return on invested capital could decrease by over 35 percent (Table 39). Cash flows are estimated to be reduced by about 28 percent and cash flows as a percent of invested capital will drop from 14.2 percent to 10.2 percent. The net present value (Table 41) declines but is still positive even if costs are 40 percent higher than estimated. Thus those plants that are in operation should be able to cover waste management costs.

Cattlehide Split Tanneries

Only one model cattlehide split tannery was developed. The imposition of hazardous waste management costs on this model reduces its base case after-tax income from $65,000 to $28,000 with a corresponding decrease in its returns on sale (from 3.8 to 1.6 percent). This reduction affects the models return on investment by decreasing from 10.8 percent in the base case to 4.6 percent after the imposition of waste related costs (Table 39). These are the largest impacts incurred by any model plant as split tanneries waste loads are the second highest of the industry and they produce the lowest valued product.

As shown in Table 40, the cattlehide split tannery's cash flow is reduced from $95,000 to $58,000 after hazardous waste management regulations. This results in the cash flow expressed as a percent of invested capital decreasing from 15.9 percent in the base case to 9.8 percent.

The models net present value remains positive after hazardous waste management costs are incorporated into the model. However, the NPV does become critically low, dropping from $283,000 to $10,000 and if costs are increased 20 and 40 percent the NPV ranges from a negative $45,000 to a negative $100,000. Thus, split tanners will be able to maintain minimum viability on the average but depending on costs, specific plants could be financially theatened.

Sheepskin Tanneries

Sheepskin tannery models were utilized to depict the no-beamhouse tannery operations. The resultant impacts of hazardous waste management costs on these models are generally low and are depicted below.

After-Tax Income. As shown in Table 39, the sheepskin tannery models' incomes are reduced by $4,000, $10,000 and $12,000 for the small, medium and large models, respectively. These reductions represent declines in income of 15 percent for the small model and 19 and 5 percent for the medium and large models, respectively.

Return on Sales. The sheepskin tanneries' returns are reduced from fairly low levels in the base case to even lower levels. After hazardous waste management, the small models return on sales is only 2.2 percent and the medium models is 2.1 percent. The large models' return is reduced from 4.4 percent to 4.1 percent by the imposition of regulations (Table 39).

Return on Invested Capital. Table 39 also depicts the sheepskin models return on invested capital both before and after hazardous waste management costs. As shown in the table, the returns are reduced; however, the magnitudes of the reductions are not great and the impacted returns appear to be relatively healthy with the past waste management returns being 27.7 and 19.7 percent for the small and medium models and 33.9 percent for the large model.

Cash Flow. The cash flows of the sheepskin models are shown in Table 40. In actual dollars, the imposition of hazardous waste management results in reductions of $4,000 for the small model, $10,000 for the medium model, and $13,000 for the large model. Compared to the respective amounts of the models' original cash flows, these reductions represent reductions of less than 14 percent of the models cash flows.

Cash flows expressed as a percent of total invested capital are reduced from 45.1, 33.1 and 44.2 percent to 40.2, 29.0 and 42.1 percent for the small, medium and large sheepskin tannery models, respectively.

Net Present Values. The net present values in the base case are all positive with the small models' NPV being $222,000, the medium model being $441,000 and the large models' NPV being $2,107,000. After hazardous waste costs, the NPV are reduced to $212,000, $420,000, and $2,056,000 respectively (Table 41).

Shearling Tanneries

The resultant model tanneries' impacts on shearling tanneries are also generally low. For example, the small shearling tannery model will incur a reduction of 9 percent, or $8,000 of its base case incomes by paying costs to dispose in a secure landfill. This will result in a reduction of the models return on sales from 5.9 percent to 5.4 percent and the return on invested capital will decline from 12.6 percent to 11.5 percent (Table 39). The small models' cash flow will decline by $9,000 to an after control amount of $125,000 which will result in the cash flow as a percent of invested capital decreasing from 19.0 percent in the base case to 17.9 percent after impacts (Table 40). As shown in Table 41, the models' NPV will decline from $826,000 in the base case to $816,000 after incurring hazardous waste management costs.

The large shearling tannery models' income will decline by 4 percent from $265,000 to $254,000 when hazardous waste management regulations are met. This will result in the models' return on sales to decrease from 5.3 to 5.1 percent and its return on invested capital to decrease from 11.3 to 10.8 percent (Table 39). The models' cash flow will decline by only $11,000 to an after controls amount of $403,000. This cash flow reduction will correspond to a decrease in its cash flow expressed as a percent of invested capital decreasing from 17.7 to 17.2 percent (Table 40). The large shearling tannery models net present value before hazardous waste expenditures, its NPV is reduced by 1 percent to $2,582,000.

C. Production Effects

The Leather Tanning and Finishing Industry can accurately be depicted as having experienced a deteriorating phase until 1975 and 1976 at which time total industry production increased for the first time in eight years. Prior to 1975, industry production dropped substantially each year from a peak physical volume of 32.4 million cattlehide equivalents in 1967. The volume in 1974 was less than 20 million cattlehide equivalents, or a decline of 38 percent from the peak year (1967).

Two major factors have contributed to the decline experienced by the industry:

1. Increased international competition
2. Increased competition from synthetic leathers both in terms of physical product and price.

During 1975, the tanning industry experienced a growth situation which resulted in the industry's annual production to increase from less than 20 million cattlehide equivalents in 1974 to nearly 22 million by the end of 1975. This growth situation was partially resultant of improvements in the domestic tanners competitive environment as well as increased demand by consumers for the natural look (i.e., leather).

Production of leather is dominated by the large and medium sized plants. Thirty one percent of the tanneries are categorized as large (or extra-large) and handle approximately 68 percent of the industry's volume. Twenty one percent of the tanneries are categorized as medium and process an estimated 19 percent of the volume. The remainder, about 50 percent, are small or extra small operations which as an aggregate produce only 13 percent of the total industry volume.

Plant Closures

According to the records of the Tanners' Council of America, 45 tanneries have shut down or ceased operation between 1968 and 1975. The reasons for these closures vary, however, some of the more important factors include:

- increased international competition
- increased strides in the production of synthetic leather
- higher per unit cost of production in some plants -- especially the smaller size
- lower per unit profit
- difficulty in meeting (physically and financially) occupational safety requirements
- plants becoming physically worn out
- inadequate owner income
- present owner reaching retirement age

It is anticipated tanneries will continue to close in the future for the same or at least similar reasons as those stated above. This must be considered when estimating plant closures attributed to hazardous waste management requirements.

As was discussed in Chapter II, Methodology, barring unusual circumstances, most firms would cease operations if they could not adequately absorb required costs. The most obvious measurement of a firm's ability to absorb the costs is its ability to maintain a positive income after incurring hazardous waste management expenditures.

If the situation arises where incomes are negative, some firms will remain in operation as long as they can cover their variable costs (positive cash flows). However, as they will eventually be required to meet their overhead expenses, these firms cannot operate in this manner indefinitely.

The remaining situation that could arise is when firms maintain a positive income and generate a net present value (NPV) of their cash flows at their cost of capital which are positive. This indicates that these firms are earning a return on their operation which exceeds their cost of capital. If their NPV's are negative then the firms could liquidate, realizing salvage value in cash, and reinvest in a more financially viable investment (one which would earn at least their cost of capital).

With the above in mind, review of the model plants' impacts reveal that in all situations, the models maintained positive profitability levels after incurring the costs of hazardous waste management (Table 39). Furthermore, review of Table 40 reveals that all tannery models maintained positive cash flows after meeting the proposed regulations.

Review of the models' net present values indicate that all models maintain positive net present values. Thus for these tanneries with positive NPV's, it can be expected that very few, if any, will close due to hazardous waste management regulations.

Production Loss

As discussed in the previous section, of the estimated 230 leather tanneries and finishers that potentially could produce hazardous waste, it is not anticipated that any will cease operation solely because of regulations of concern. Accordingly, it is doubtful that the leather industry's total production will be affected. This is particularly true since, during the last two years, total domestic leather produced increased by 18 percent or 3.5 million cattlehide equivalents annually. During this time, the Tanners' Council of America reported additional closures. Thus it appears the industry does have the capability to absorb the volume lost by those operations ceasing operations within a reasonable range.

D. Employment and Community Effects

The estimated number of employees in the Leather Tanning and Finishing Industry is estimated to be 26,000 in 1976, up from 23,000 in 1975. Historically, however, the number of employees has declined. In 1967, employment was approximately 31,000.

As there are no projected plant closures attributable solely to hazardous waste management, it is anticipated there will be no loss of employment resulting from the imposition of the regulation. Accordingly, it is doubtful that communities will be affected either.

E. Balance of Trade Effects

The impacts of hazardous waste management are expected to result in little or no effect on the United States' balance of trade. As discussed in previous sections, the Tanning Industry has historically been losing volume to international competition. However, the majority of these losses are attributable to trade restrictions and agreements and not so much due to lack of competitive prices. Additionally, since domestic leather prices are not expected to increase because of hazardous waste management, it is doubtful that the competitiveness of the domestic tanners will be affected and thus their ability to compete on the international market will remain approximately the same.

IX. LIMITS OF THE ANALYSIS

There is little published information regarding the structure, pricing and economic data of the Leather Tanning and Finishing Industry. Much of the descriptive data used in this report were originally compiled by the Tanners' Council of America for inclusion in the previous EPA reports concerning the Leather Industry and, at the time, were considered to be the most complete and accurate source available. This information has been updated for utilization in this report. Also, information from an industry data collection portfolio provided additional input for the report. Nevertheless, much of the information required to develop this report still did not exist in quantifiable form but was derived from personal discussions with individuals knowledgeable of the industry. This chapter discusses the general accuracy of the report and some of the key assumptions involved.

A. General Accuracy

The data and other information used in this study were drawn from published governmental reports, the industry trade association, an industry data collection portfolio, and from extensive contacts with individual tanneries. Information on the status of hazardous waste generation, recommended management technologies and costs were furnished by EPA. Every effort was made to verify the data and other information used.

Detailed data on size distribution by types of plants are not available. Using industry size distributions from the Census of Manufactures, together with information obtained from the Tanners Council, the technical contractors and contacts, segmentation of size and type of plants were made for each industry.

Financial information concerned with investments, operating costs and returns was not available for individual plants or firms. As a result, the financial aspects of the impact analysis were, of necessity, based on synthesized costs and returns for "representative" types of model plants. These costs and returns were developed from a variety of sources including published research from universities and government agencies, information obtained from the data collection portfolio and published financial performance data.

Throughout the study, an effort was made to evaluate the data and other information used and to update these materials wherever possible. Checks were made with informed sources in both industry, government and universities to help ensure that data and information used were as reliable and as representative as possible. For example, construction costs, working capital requirements, proportions of capital financed through debt and equity and profitability ratios were checked with the appropriate persons in industry firms who are experienced and knowledgeable in these matters. Efforts were made to use the latest data available.

Specifications of the contract require the Contractor to use waste management costs provided by EPA. The Office of Solid Waste Hazardous Waste Division, EPA, through its technical contractors, provided recommended alternative disposal systems and annual operating costs which were adapted to the types and sizes of "representative" model plants used in this analysis. The recommended alternative primarily consisted of disposal in secure landfills, Pathway Level III technology. Level of waste generation by plant type was taken from the EPA Assessment study and checked to the extent possible by the Contractor.

Given the accuracy of the costs for disposal in secure landfills, it is believed that the analysis represents a usefully accurate evaluton of the economic impact of the proposed pretreatment guidelines.

B. Range of Error

Different data series and different sections of the analysis will have different possible ranges of error.

Errors in Data - Estimated data error ranges as an average for the industry are as follows:

		Error Range (Percent)
1.	Information regarding the organization and structure of the industry, number, location and size of plants, and other information descriptive of industry segments	± 10
2.	Price information for products and raw materials	± 15
3.	Cost information for plant investments and operating costs	± 15
4.	Financial information concerning the industry	± 10
5.	Hazardous waste management costs	± 30 to 40

C. Critical Assumptions

In an economic impact analysis of most any industry, it is inevitable that simplifying assumptions must be made to bring the problem into a framework of analysis consistent with the constraints of time, budget and data availability. The major critical assumptions used in this analysis are as follows:

1. Types and sizes of the model plants are representative of plants actually existing in the industry and of plants expected to be built in the future.

2. It is assumed the financial data are representative of costs and returns of existing plants or new plants to be constructed after promulgation of proposed regulations. As stated earlier, the model plant financial data are on a constant 1975 dollar basis and can be adjusted at future times to reflect the future economic activity.

3. Levels of profitability reflected in model plant profiles (based primarily on the average of the period from 1970 to 1975 so as to include years of high and low profits) will be the same in the future.

4. It was assumed that the economic impacts of hazardous waste management on those products not included in the detailed analysis of "representative" plants could be evaluated in general terms through associating them with those "representative"model plants for which detailed analyses were made. This association was based primarily on the fact that models were developed for a single product plant which represented a majority of industry segment's production. In most cases, there were actual plants producing products in similar combinations to the model plants which was the primary objective where possible.

5. Hazardous waste management costs and waste stream characteristic estimates were supplied by the Office of Solid Waste, Hazardous Waste Division, EPA. It is assumed that these data are realistic in terms of:

   (a) Applicability of disposal technology recommended.
   (b) Annual operating costs for the technology.

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